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AUTHOR	Stone, Sally F.
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ABSTRACT

The ecology and management of special habitats is the theme of this instructional guide. It contains 24 activities designed to help teachers familiarize their students with dune, cave, cliff, bluff, and urban habitats in Illinois. Each activity (which is ready to be copied and given to students) includes an objective (called a mission) and instructions which speak directly to the student. Although the activities are best suited for students in grades 4-8, certain activities are appropriate for students in kindergarten to third grade and for students in grades 9-12. Background information for teachers is provided, including brief comments on adapting exercises for students in primary and high school grades and special instructions for the activities. (JN)

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The Illinois Natural Heritage Conservation Education Kit V

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About This Kit:

The Ecology and Management of special Illinois habitats is the theme of this Kit. The twenty-four exercises in the Kit are designed to familiarize students with Illinois' dune, cave, cliff, bluff, and urban habitats. Although the materials are probably best suited for students in grades 4-8, most of the exercises can be easily adjusted to match the skill level of nearly every primary and secondary grade.

Natural Heritage Month

As Natural Heritage Month in Illinois, April presents itself as a good time for teachers to use the contents of this Kit. Natural Heritage Month includes the observances of Earth Day (usually the third Tuesday), Arbor and Bird Day (the last Friday), and Bird Appreciation Week (the last week). Though the activities and exercises in this Kit can be used in relation to these special days in April, the materials are always topical and can be used at any time of the year.

Illinois Rivers Month

June is Rivers Appreciation Month in Illinois with a year-round theme of "Take Action for Clean Water". Water plays an important role in all special habitats. For information about classroom activities about the water resources of Illinois contact the Community Relations Office, Illinois Environmental Protection Agency, 2200 Churchill Road, Springfield, Illinois 62706 (217) 782-5562.

Giant Coloring Page

A special feature of this Kit is the inclusion of a Special Habitat Coloring Page, which features native Illinois plants and animals. The *coloring page* serves as as an important visual reference for students as they complete exercises in the instructional guide.

Step into the Wild

A special "Step into the Wild" achievement coupon appears at the top of twenty-five exercises in this Kit. Students who complete those exercises are asked to cut out the coupons and paste them onto the *Special Habitats Challenge Page* (3). Students who send in at least one coupon on their Challenge Pages to the Illinois Department of Conservation at the address shown below will receive a conservation button entitled *"Step into the Wild"* and featuring the cave salamander. To speed mailing, teachers are asked to gather Challenge Pages and send them in together as classroom sets.

Let Us Hear from You:

Teachers and resource interpreters who use this Kit are asked to please complete the Teacher Questionnaire included in the envelope. Your comments and suggestions will help us continue to prepare useful and interesting educational materials. Please use the flip side of the Teacher Questionnaire to order books, posters, and additional teaching kits from the Illinois Department of Conservation. We would like to call your attention to the fact that we will send a classroom set of the *Giant Special Habitats Coloring Page* to any Illinois teacher or resource interpreter.

Illinois Department of Conservation
life and land together

Communications Program
Division of Forest Resources and Natural Heritage
Lincoln Tower Plaza
524 South Second Street
Springfield, IL 62706

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Text: Sally F. Stone, National Association of Young Naturalists, 119-27 College Ave., Somerville, MA 02144

Illustration: Heidi Johanna Selig
70 Pearl St., #1-401
Brookline, MA 02146

Robert F. Eschenfeldt
Squires Ad Agency / and Art Studio
1427 S. 8th St.
Springfield, IL 62703

Design: Linework, 11 Devereaux St., Arlington, MA 02174

Text Editor: Beatrice T. Galley, National Association of Young Naturalists

Technical Editors: From the Illinois Department of Conservation: Carl N. Becker, Vernon M. Kleen, John Schwegman, T. Miller, David Klinedinst, Jim Allen, and James Garner

Distribution: Don Roderick, Illinois State Board of Education, Barbara Hohimer, Goodwill Industries, Springfield, Illinois

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Illinois Department of Conservation
Division of Forest Resources and Natural Heritage

This Kit is endorsed by the following organizations as a valuable program for teachers and students seeking to learn more about Illinois' natural heritage. Teachers are encouraged to write to each of these organizations to obtain more useful conservation education materials.

NATIONAL WILDLIFE FEDERATION
1412 Sixteenth Street, N.W., Washington, D.C. 20036

National Audubon Society
950 Third Avenue
New York, NY 10022

Environmental Education Association of Illinois
7600 Appleton Rd., Belvidere, IL 61008

ILLINOIS department of AGRICULTURE
Illinois State Fairgrounds, Springfield, Illinois 62706

Illinois Environmental Protection Agency
2200 Churchill Rd.
Springfield, IL 62706

Illinois State Board of Education
100 N.First St., Springfield, IL 62777

Illinois Environmental Council
206 South Sixth Street, Springfield, IL 62701

Open Lands Project
53 West Jackson Boulevard
Chicago, Illinois 60604
Telephone 312-427-4256

United States Department of the Interior
FISH AND WILDLIFE SERVICE

A Special Habitat Challenge

Dear Student:

We invite you to a special challenge. But before you take on our challenge, ask yourself these questions. Do you think you could explore the dunes along Lake Michigan and identify every plant and animal you see? Could you strap on a head-lamp and venture into a dark cave to discover its secrets? Are you up to scaling the steep wall of a cliff to locate rare wildflowers and spy on animals as they hunt and raise their young? And what about in the town where you live, could you find some wild places where rabbits hide, birds fly and snakes slink? Could you design a wild area for animals in your own backyard?

If you answered "yes" to any of those questions, our challenge is your to meet. All you need is this Kit, a pencil, scissors, glue, paper and a good dose of curiosity. And, I'll tell you right now that you'll need to depend most upon your curiousity because our challenge will require you to ask yourself: HOW, WHY and WHEN? Over and over again, you'll run up against difficult questions like–HOW do bats navigate in the dark, WHY is the piping plover on the brink of extinction, and WHEN is it time for us to protect our wild creatures?

We believe that there is not a single question or mystery in this Kit that you cannot solve. It will take a lot of work, but there are 24 exercises in the Kit that contain all of the information you will need. When you complete an exercise, cut out the Achievement Coupon at the beginning of the exercise and paste it onto one of the circles shown below. Then, if you have at least one coupon on your page, mail it to the Illinois Department of Conservation. That will prove that you have met our challenge, and to show our appreciation and pride, we will send you the official Illinois conservation button, "Step Into The Wild."

Once you have your button in hand, you will have accomplished an important task. You will have learned about four of Illinois most special natural habitats–dunes, caves, cliffs/bluffs and urban areas. In our state, these habitats are called "special" because they are not as common or well-known as our great forests, wetlands and prairies. However, this doesn't mean that they are any less valuable. Special habitats are the homes of countless and precious plants and animals. Many of those species are endangered and just barely clinging to life. That is why this Kit and the challenge before you is so worthwhile.

Sincerely,

Michael B. Witte
Director
Illinois Department of Conservation

Background Information for Teachers

Each exercise in this instructional guide is ready to be copied and given to students. In addition, the instructions for each exercise speak directly to the student. The following includes support information teachers may find helpful when working with the exercises.

Grade-level Appropriateness

While this Kit is best suited for students in grades 4-8, certain exercises are appropriate for students in lower, as well as higher, grade levels. The following is a recommended list of appropriate exercises and portions of exercises for grades K-12. We are also including some techniques teachers can use to adapt exercises to fit the needs and abilities of their students. It is only a suggested list. We realize teachers will best be able to access the suitability of exercises for their students.

Kindergarten to 3rd Grade

Giant Special Habitat Coloring Page
Cardinal Model
Special Habitat Challenge Page

In Chapters 1-6, most exercises can be used by students in grades 2-3 if read and completed as a class. In addition, we recommend these adaptations. The animals in the Field Guides in Chapters 2-3 can be colored by students. The mystery species in the field trips in Chapters 2 and 4 can be identified beforehand by the teacher. The field trip will then read like an adventure story. Completion of the four habitat models in Chapter 3 can be simplified if students are asked only to paste in the people symbols and wildlife species. Teachers can then choose from the other Work Steps as appropriate.

Grades 4 to 8

All exercises.

Grades 9 to 12

All exercises, especially the field trips in Chapters 2 and 4 and the habitat models and backyard habitat-planning exercise in Chapter 3. A challenging adaptation of Chapter 3 for older students would be to require students to write an urban field trip. Students can use the Urban Field Guide to fashion a list of mystery species. To structure the field trip, the students can use the format of the dunesland field trip (Chapter 2) and/or the cave field trip (Chapter 4).

Special Instructions for Exercises

Giant Special Habitat Coloring Page: The Coloring Page provides two activities for the student. First, since most of the species on the Page are not labeled, the student can use the Field Guides in this Kit to identify and label them. All of the species that are not included in the Field Guides are already labeled at the bottom of the Page. Once the student has labeled the species, he or she can color them. Details of their colorations are also included in the Field Guides. One Coloring Page is enclosed in this Kit. Classroom sets of the Page can be ordered by completing the Teacher Questionnaire.

Cardinal Model (pages 71-72): This model is easy to put together, and the result is a remarkably accurate and life-size model of a cardinal. The entire pattern page should be glued to construction paper before cutting out. All coloring should be done before cutting and gluing. Use white glue instead of paste. We recommend hanging the model by a string.

Special Habitat Challenge Page (page 3): Teachers are asked to please send Challenge Pages as classroom sets to the Department of Conservation at the address shown on page 1 of the Instructional Guide.

Chapter 1 - Building a Spy Manual (page 5): Because this Chapter acquaints students with terms central to the study of natural ecosystems, it should be fully explored and completed before beginning Chapters 2-6. The Chapter's finished product, a natural resource "spy manual," will be a handy and necessary reference for each student as he or she takes on the remainder of the Kit's assignments.

Chapter 2 - The Illinois Dunesland (pages 7-22): This chapter examines the dunesland at Illinois Beach State Park. While there are many dunes located along Illinois' waterways, the Illinois Beach area contains our only dunesland ecosystem of significant size. The instructions for completing the Chapter's imaginary dunesland field trip are explained fully and clearly. Teachers should stress, however, that students should be careful when they cut out animals and plants from their Field Guide. When they cut out one species, they should not cut into another species. They will need each species intact as they complete the chapter.

Chapter 3 - Urban Habitats in Illinois (pages 23-46): This chapter features build-it-yourself habitat models. Again, the instructions given should be adequate for satisfactory completion. Teachers should encourage students to paste items onto their models in such a way as to not cover up one item with another. The last exercise, "Designing a Backyard Habitat," is a classroom exercise but can be used by a student or a class to actually plan a real-life backyard planting operation.

Teachers and/or students desiring more information about backyard habitat planning can order the highly recommended "Gardening with Wildlife" Kit from the National Wildlife Federation, 1412 16th St., N.W., Washington, DC 20036. The cost of the Kit is $14.95.

Chapter 4 - Cave Habitats in Illinois (pages 47-61): For the field trip in this chapter, note the Special Instructions shown above for Chapter 2. We would like for teachers to stress that actual field trips through a cave should not be attempted by anyone who is not an experienced spelunker, or accompanied by a spelunker. For persons not thoroughly familiar with caves, such a trip would be dangerous and, most probably, destructive to the sensitive cave environment.

Chapter 5 - Cliff/Bluff Habitats in Illinois (pages 62-69): This Chapter features an exercise wherein students look at a stopped-motion scene, study the plants and animals present, and then predict what *could* happen next in the scene. Students should use what they've learned about the particular plant and animal species in their Field Guides to make their predictions.

Chapter 6 - Urban Sleuthwork (page 70). This is the Kit's outdoor activity. Students should use the Urban Field Guide (pages 27-31) to find and identify plants and animals. Although we have tried to show as many species as space allows, we encourage the use of various field guides commonly found in bookstores to obtain maximum results.

Chapter 1

Building Your Spy Manual

MISSION

Prepare a spy manual that you can use to complete the exercises in this Kit.

INSTRUCTIONS

Read the information below and complete Work Step 1.

As you complete Chapters 2-5 of this Kit, you will be learning about some of Illinois' special habitats. Dunes, cliffs/bluffs, caves, and urban areas are all thought of as special habitats because they are not as common or as well-known as our forests, wetlands, and prairie habitats.

To complete your investigation of each special habitat, you will have to work as a "spy" in that habitat. To help you understand how that will work, let's think for a second about what a spy is. Usually, a spy is someone who sneaks around an area to collect information about it. A spy then uses that information to build his or her understanding of the area.

In this Kit, you will be that kind of spy in each of the special habitats mentioned above. You will be traveling through the habitats, gathering data about what they are like and spying on their plants and animals. Once you are done with your spy work, you will have the information you need to build your understanding of the habitats.

Every spy must undergo spy training and have a spy manual. Once you have completed Work Step #1 below, you will have received your spy training. Plus, you can then use these pages as your spy manual to help you with your assignments in Chapters 2-5.

Work Step #1

Listed below are nine terms you will need to know and understand to complete your spy work in each habitat. The terms, shown in bold to the right of their numbers, explain many things about our natural environment, including how plants and animals live together in a community, how plants make food and reproduce, and how animals get and pass on food.

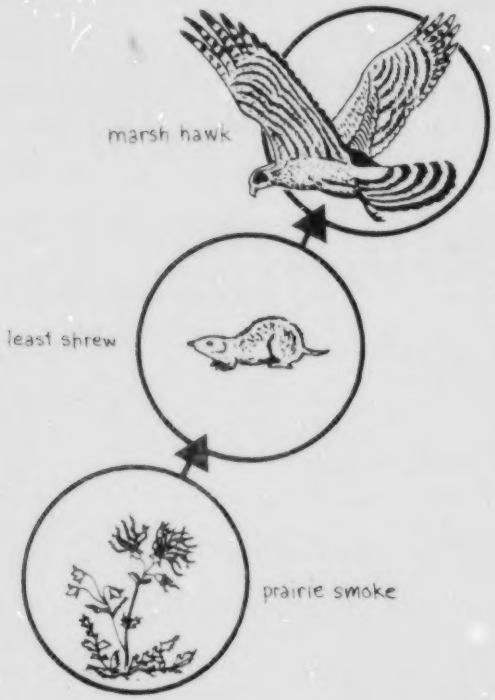
Read the definition of each term carefully. Then on a separate sheet of paper, define each term in your own words. Once you have finished, select a classmate as your spy training partner. Ask your partner to define the first five terms. Then you define the last four terms for your partner.

Spy Training Terms

1. **NATURAL HERITAGE**: The total natural environment is our *natural heritage*. It includes our natural lands and all of the native plants and animals living in Illinois.
2. **HABITAT:** All of our natural lands provide a *habitat* or home for plants and animals. Individual kinds, or species, of plants and animals live in the type of habitat they are best suited for. For example, the great horned owl nests in trees so it lives in a forest habitat. The Indiana bat is suited to live in a cave habitat because it needs a warm, dark place to hybernate during the winter.
3. **ECOSYSTEM:** A community of plants and animals living together in a habitat is called an *ecosystem*. Within the ecosystem, the plants and animals live in a state of mutual dependence. That simply means that the plants and animals depend upon each other for survival. Animals depend upon plants for food, and plants rely upon animals to spread their pollen and seeds. Think of an ecosystem as a town where each citizen or member of that town has a special job to do and something to contribute. That is how the town or ecosystem operates smoothly.
4. **PHOTOSYNTHESIS:** Plants produce the first food in an ecosystem through the process of *photosynthesis*. Using sunlight as energy, the plants combine water and carbon dioxide in the presence of chlorophyll to make glucose

or food molecules. Those food molecules are then stored in their stems, leaves and fruits.

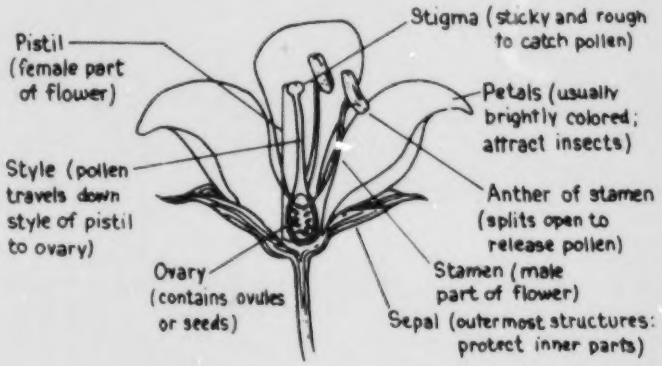
5. **FOOD CHAIN:** In an ecosystem, food passes between plants and animals through *food chains*. For example, when a mouse eats the seeds of a plant and is then preyed upon by a hawk, a food chain with three links is formed. The plant is the first link, the mouse is the second and the hawk is the third.



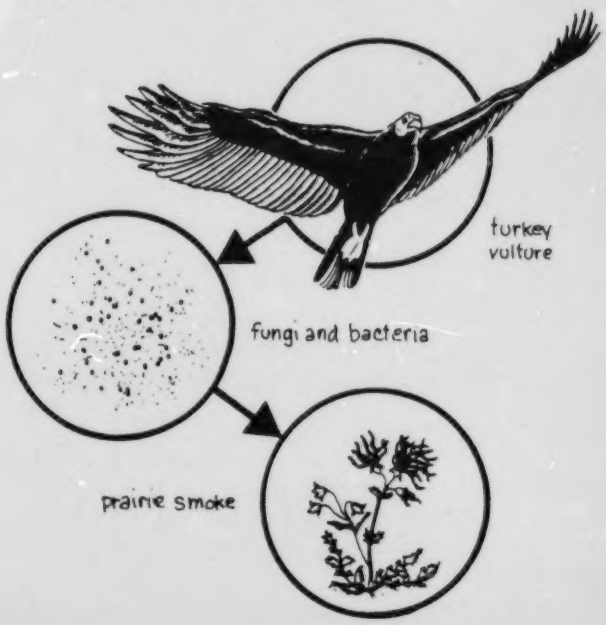
6. **FOOD WEB:** There are many food chains in an ecosystem. All of the food chains put together form a *food web*. Food flows from plants through the lines of the food web to feed all of the animals.

7. **NICHE:** Within an ecosystem, each plant and animal species occupies its own *niche*. A species' niche is its own special place to live and role to play in the ecosystem. No two species have exactly the same niche. Nature has designed it that way so every species will have enough room to live and food to eat. To help you understand, think of you own niche. Your special place to live is your bedroom in your house or apartment. The special role you play in your community is everything you do, like going to school, playing with your friends, and being with your family. No other person in your community has the exact same niche as you.

8. **POLLINATION:** In order to reproduce, plants undergo a process called *pollination*. During this process, pollen is transferred from the male part (anther) of a flower to the female part of another flower (stigma). The pollen fertilizes the eggs inside the stigma and they mature into seeds that may, someday, grow to be new plants. Some plants depend upon the wind to carry their pollen about the ecosystem. Other plants count on butterflies, bees and flys to transport their pollen from flower to flower.


Pistil (female part of flower)
Stigma (sticky and rough to catch pollen)
Petals (usually brightly colored; attract insects)
Style (pollen travels down style of pistil to ovary)
Anther of stamen (splits open to release pollen)
Ovary (contains ovules or seeds)
Stamen (male part of flower)
Sepal (outermost structures: protect inner parts)

9. **NUTRIENT ELEMENT CYCLING:** When plants and animal die, their dead tissues are attacked by bacteria and fungi. The bacteria and fungi break down the tissues into important nutrient elements such as carbon and nitrogen. Those nutrient elements are then stored in the soil until they are taken in through the roots of a living plant. The end result is that dead materials are recycled into nutrient elements that can be used to help plants grow. That is what is meant by *nutrient element cycling*. Through this process, the nutritional resources of an ecosystem are never wasted; instead, they are continually recycled to keep the ecosystem working.



Chapter 2

The Illinois Dunesland

Dear Student:

Your assignment in this chapter is to investigate a type of habitat known as a dunesland. To do that, you will be following a plan of action that will will take about five days. As you begin each day's work, you will be given a special mission as well as instructions to follow. Please remember to keep your Spy Manual close at hand at all times. It contains valuable information that you will need to carry out your mission. You can begin your assignment by completing the work for Day 1 as shown below.

DAY 1 - Learning The Natural Heritage of the Dunesland

MISSION

Discover the nature, location and value of the dunesland.

INSTRUCTIONS

Read the information below and complete Work Steps 1-5.

Just forty miles north of the hustle and bustle of Chicago, there is a quiet wilderness area known as Illinois Beach State Park. This long, slender park hugs the shoreline of Lake Michigan from Waukegan north to the Wisconsin-Illinois border. Within its boundaries, the only dunesland in Illinois is located. Much of the dunesland is included in an Illinois Nature Preserve, which is also part of the park.

The dunesland is the open, sandy land directly bordering Lake Michigan. It has a pebble-covered beach, windswept dunes and low-lying sand prairies. On its eastern edge, the waves of the lake lap onto its beach. To the west, it is bounded by the forests of northern Illinois.

For plants and animals, the dunesland is a natural haven. Sandpipers walk its beach, toads hide in its grassy dunes, voles build runways through its prairies, and hawks hunt along its boundary with the forest. For many of these plants and animals, the dunesland is one of their only homes in Illinois. Endangered species like piping plover and dune willow are found nowhere else in our state.

The dunesland is protected from development by law because it is part of Illinois Beach State Park. But the dunesland in Illinois has not always fared so well. In fact, it used to be much larger. Illinois once had a dunesland that stretched along the Lake Michigan shoreline all of the way from South Chicago to Wisconsin. When white settlers took over the Illinois country from Native Americans in the early 1800's, they laid the foundation for the city of Chicago. Today, most of the original Illinois dunesland has been swallowed up by Chicago and its suburban communities.

As a natural habitat, the dunesland is the only place like it in Illinois. That is why the dunesland is valuable not only to plants and animals but to people as well. As a part of our natural environment, its well-being is directly tied to ours. And since it is a one of a kind, it is the only place where we can enjoy and study a dunesland. Maybe someday you will be able to visit the dunesland; for now, however, remember that it is an important and unique part of our natural heritage in Illinois.

Work Steps

1. In what park is the dunesland located? What are the boundaries of that park?
2. Describe the nature of the dunesland.
3. Why is the dunesland valuable to plants and animals, especially endangered and threatened species?
4. What were the boundaries of the original dunesland in Illinois? What has happened to most of it?
5. Why is the dunesland a valuable part of our natural heritage?

DAY 2 - Mapping the Dunesland Habitat

MISSION

Learn to identify the five different habitat areas in the dunesland and some of the plants and animals that live in them.

INSTRUCTIONS

Study the dunesland map on page 10, read the information below, and complete Work Steps 1-3.

As you can see in the map on page 10, the dunesland is a narrow strip of land that runs inland from the lake's edge to a forest. In the map, the dunesland is divided by dotted lines into five areas. Each of those five areas provides a habitat for plant and animal species. But as you can see in the map, the nature of the habitat is not the same in every area. For example, some areas are flat while others are shaped by rolling dunes. One area is bare of plants, but all of the others are heavily stocked with grasses, shrubs or trees.

Work Steps:

1. To better understand the nature of the habitat in each of the five areas of the dunesland, read the descriptions of the areas below. Then, using what you have learned, label and number the five areas shown in the map. To help you get started, Area #1 is already labeled and numbered. Once you have finished your work, move onto Work Step 2.

   Area #1 - The Beach: The *beach* is the narrow stretch of sand that runs closest to the water's edge. Free of vegetation, the beach is like a desert.

   Area #2 - The Primary Dunes: Waves, driven by the wind, roll onto the beach and push sand onto low ridges or dunes. These grass-covered dunes are called *primary dunes.*

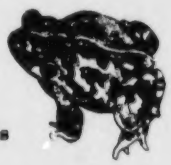
   Area #3 - The Sand Prairie: On the inland side of the primary dunes, grasses, flowers and a few shrubs grow in a *sand prairie.* In the lowest parts of the prairie, shallow marshes are often found.

   Area #4 - The Tertiary Dunes: As great gusts of wind and powerful waves pound the shore, sand is swept back from the sand prairie onto a second set of grass covered dunes called *tertiary dunes*

   Area #5 - The Savannah: Just inland of the tertiary dunes, trees begin to appear amidst the grasses, flowers and shrubs. This area, a combination of prairie and forest, is called a *savannah.* Moving inland through the savannah, the trees begin to outnumber the smaller plants until the savannah gives way to a full-fledged forest. That is where the dunesland ends and the forest begins.

2. In the dunesland, individual animal species live only in the areas or areas that offer the kind of habitat they need to survive. For example, the piping plover nests on bare sand, so it lives along the beach. The upland sandpiper, on the other hand, prefers to place its nest in a spot well hidden by tall grasses. Therefore, it lives in the sand prairie area.

   Shown below are five animal species along with descriptions of the habitat area each needs to survive. Study the animals and their habitat needs carefully. Then, cut out each animal and paste it into one of the habitat areas shown in the map on page 9. Place each animal in the area that offers the kind of habitat it needs to live and grow. Once you are done, move on to Work Step 3 on page 9.



Fowler's Toad

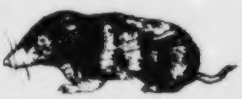
The dune closest to the water

Meadow Vole

The area with grasses, flowers and a few shrubs

Savannah Sparrow

The dune farthest from the water



Short-tailed Shrew

The area with both grasses and trees

Mystery Snail

The sandy stretch closest to the water

3. Like the animals, the plant species also live only in the habitat areas of the dunesland where they are best suited to live and grow. But unlike the animals, the plants actually help to create the habitat in the dunesland. As you can see in the map on page 10, Area #1, the beach, is a barren stretch of sand, very similar to a desert. Area #5, the savannah, on the other hand is a lush world of trees, flowers and shrubs. It may sound surprising, but the dunesland plants are responsible for creating the dramatic difference between the beach and the savannah. This is how they do that.

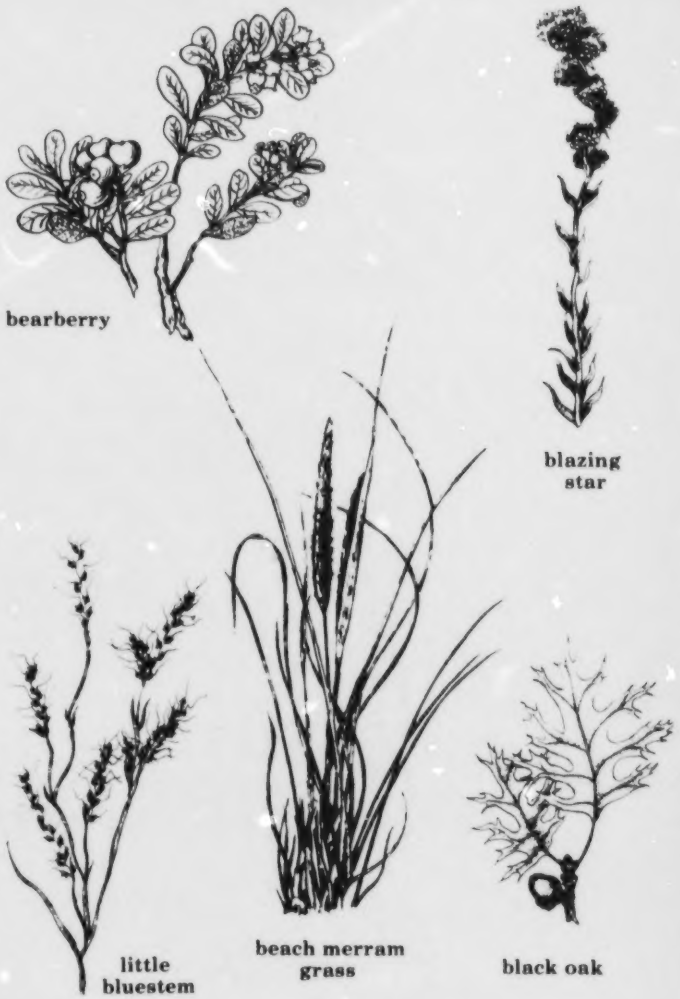
The beach and the primary dune areas are the wild edge or frontier of the dunesland. Like all frontiers, the dunesland frontier is a tough place to live. The sun beats down and drys out the sand. As waves and wind pound the beach, the sand is constantly being blown and washed about. Under these conditions, only plants adapted to live in dry and shifting sand can survive.

Beach merran grass and dune willow are two of the plants that can live on the dunesland frontier. And because they do, they are called pioneer plants. But these pioneer plants do much more than just live on the frontier, they help tame it.

The pioneer plants tame the frontier by stabilizing and enriching the sandy soil. They stabilize the soil by sending their roots deep into the earth; the roots then grip the particles of sand and hold them in place. The plants enrich the soil when they die. Their dead roots and leaves decay and add nutrients to the soil.

In the firmer, nutrient-rich soil created by the pioneer plants, new and different plant species are able to grow. That is why the sand prairie, the area just inland from the primary dune, is stocked full of grasses, flowers and shrubs like little bluestem, blazing-star and bearberry. These plants spread across the tertiary dune and into the savannah. As they stabilize and enrich the soil, the soil becomes strong enough to support the large black oak trees that grow in the savannah.

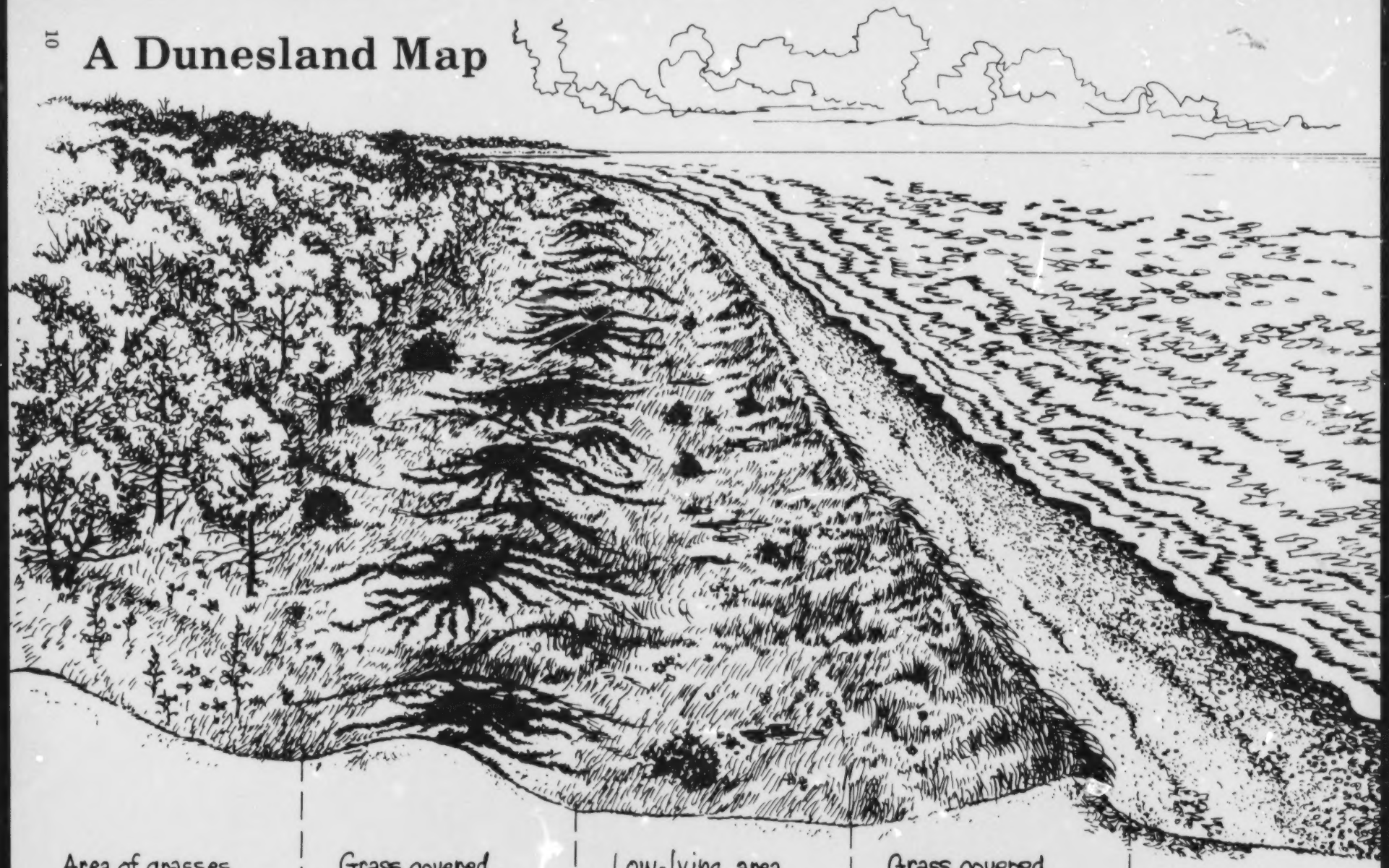
Shown above on the right are five plants. Written below the plants is a story about how the plants change the dunesland from a desert-like beach to a thickly vegetated prairie, and finally, to a lush savannah. Many of the details in the story are not filled in. It is your job to fill in the missing details. Use your map and all of the information on this page to do that. Then after you have finished, cut out each plant and paste it into the area of the dunesland where it lives on the map on page 10.



Along the dunesland's wild edge or _____, beach merram grass is a _____ plant. Its long roots _____ the soil in place. When it dies, it roots and leaves decay and add _____ to the soil. In this way, beach merram grass and the other pioneer plants _____ the frontier by stabilizing and enriching the soil.

In the firmer and richer soil of the _____ prairie, tertiary _____ and savannah, grasses, flowers and shrubs like little bluestem, _____, and _____ are able to grow. As they stabilize and enrich the soil, large trees like _____ are able to take root and grow. This is the story of how plants change the dunesland from a desert-like _____ to a thickly vegetated _____, and finally, to a lush _____. That is why each plant species is so (circle one) worthless, important.

A Dunesland Map



Area of grasses, shrubs, flowers and trees.
11 Area #_____

Grass covered dune farthest from water.
Area #_____

Low-lying area of grasses, flowers and a few shrubs.
Area #_____

Grass covered dune closest to water
Area #_____

Sandy stretch
Area # 1 12
The beach

DAY 3 - Building a Dunesland Field Guide

MISSION

Build your own Field Guide to 14 species of plants and animals.

INSTRUCTIONS

Listed below are descriptions of 14 plant and animal species. Read each species description. Then, using what you have learned, find the drawing of that species in the field guide on pages 12 and 13. Write the name of the species on the blank line beneath or beside the drawing. There will be at least one clue beside the drawing to help you make the match.

PLANT DESCRIPTIONS

prickly pear cactus: This green cactus creeps along the ground for about 2-5'. Its stems are 3-5" long pads that are covered with prickly, white spines. Its yellow flower has a red center, and its fruit is shaped like a pear.

creeping juniper: This evergreen shrub sends its branches creeping across the ground rather than up into the air. Its leaves are needle-like, and its fruit is a light-blue berry.

dune willow: This shrub grows up to 10' high. Clusters of its small flowers are borne on long, narrow catkins. Its gray leaves are heart-shaped.

ANIMAL DESCRIPTIONS:

("L"=Length of animal; "W"=Wingspan of animal.)

dainty tiger beetle: This dark-green beetle is covered with short, white hairs. L: 3/8-1/2"

elongate long-jawed orb weaver: This yellowish brown spider has long jaws and legs. Two dark stripes run lengthwise down its abdomen. L: Male 1/2", Female 3/8"

eastern hognose snake: This stout-bodied, nonpoisonous snake has a pointed, upturned snout and a wide neck. Its color varies from yellow to brown to gray or red. Its back is marked by dark blotches. L: 20-45 1/2"

ring-billed gull: This white gull has a black ring on its yellow bill. Its wings are gray with patches of black on the tips. Its call is a loud "kow, kow, kow." L: 16"; W: 49"

common tern: This endangered white bird has a black cap and a bright red-orange bill. Its light-gray upperwings are black along the tips. A harsh "kee-urr" is its call. L: 14"; W: 31"

piping plover: This endangered bird has a white head, breast and belly and a brownish-gray back and wings. A black band runs around its neck. Its bill and feet are yellow, and its call is a soft, musical "peeplo." L: 5 1/2"

upland sandpiper: This endangered bird is tan marked by brown streaks. Its head is small and its neck and yellow legs are long. It whistles a loud, shrill "whip-whee-ee-you" during courtship. L: 10"

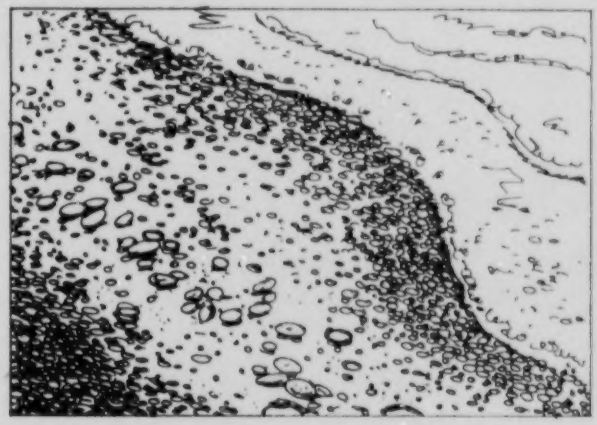
American kestrel: This small falcon has two black stripes on each side of its face. Its wings are blue, and its back and tail are rusty red. At the end of its tail, there is a black band tipped with white. Its slate blue head has a rusty cap. A sharp "killy, killy, killy" is its call. L: 8 1/2"; W: 21"

ruddy turnstone: This orange-legged bird wears a black bib aross its white breast. Its back and wings are rusty brown, and its tail is black. Its call consists of 1-8 fast, low whistles that sound like "chirrup." L: 7"

white-footed mouse: This mouse has four white feet and brown ears edged with white. It is bright brown above and white below. L 5 1/8-7 1/4"

red fox: This bushy-tailed fox is mostly yellowish red with white on its belly, throat, and cheeks. Its feet are black, and its tail is tipped with white. L 40"

Special Addition to Field Guide (Pebbles)

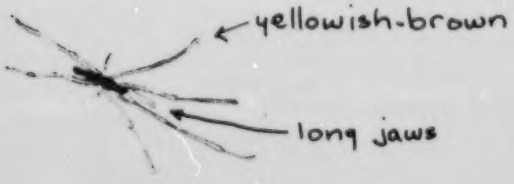


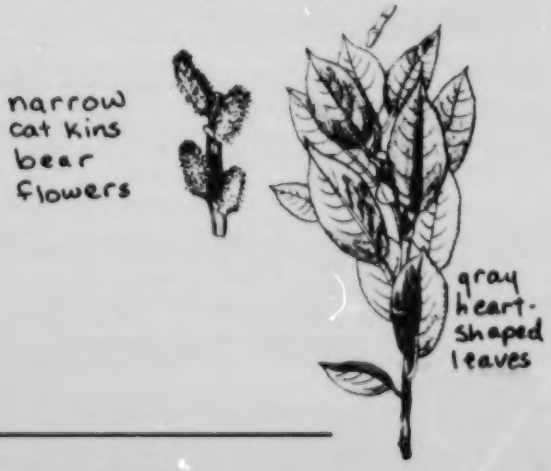
Millions of pebbles blanket the beach of the dunesland. They were left there as a result of glaciers that once covered Canada and the northern United States, including most of Illinois. As these great glaciers moved, their sharp and heavy edges tore up everything in their path. They chewed up boulders and dug out enormous basins in the earth. When the glaciers melted, the basins filled in with water. They are what we now call the Great Lakes, and the pebbles that line their shores are the bits and pieces of the boulders that the glaciers lay to waste.

BEST COPY AVAILABLE

Dunesland Field Guide

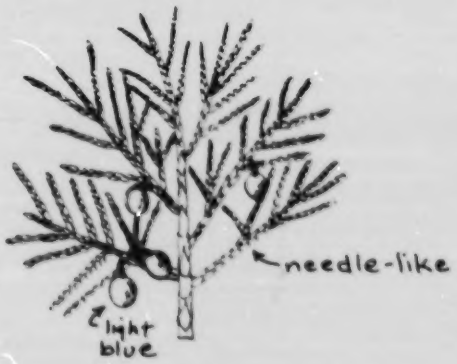
When cutting out animals, do not cross center line.

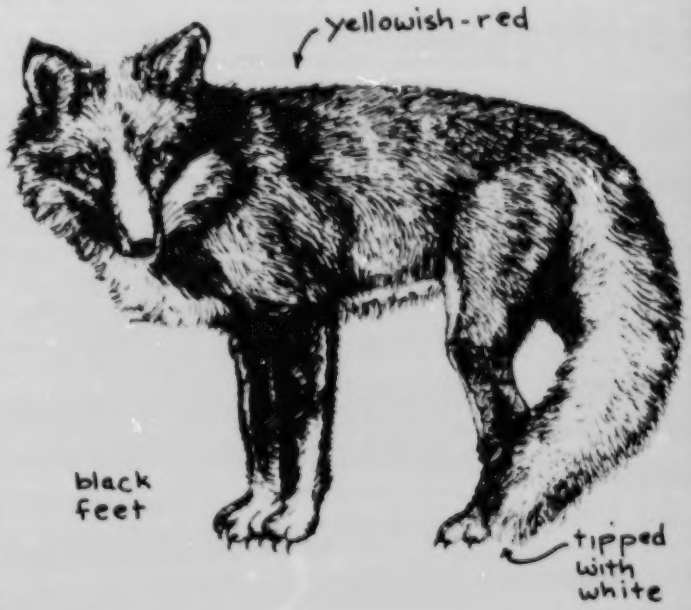




Dunesland Field Guide

When cutting out animals, do not cross center line.





DAY 4 - Taking a Field Trip Through the Dunesland

MISSION

Spy on the dunesland plants and animals.

INSTRUCTIONS

1. To carry out your mission, you will be traveling by foot through the dunesland. You will not be alone on this trip. You will be accompanied by an experienced wildlife guide named Ms. Sharon Weinman. Ms. Weinman is so good at spying on plants and animals, she has earned the nickname of "Super Sleuth."
2. Meet your guide "Super Sleuth" on the beach in the dunesland. A drawing of that meeting is shown below. Pretend you are the little spy shown in the drawing and sign your name on the blank line.
3. As you and your guide travel through the dunesland, you will see and/or hear eleven different mystery species. Upon each encounter, look up the identity of the mystery species in your field guide. Once you have identified the species, cut the drawing of it out of your field guide and paste it into the empty box shown in the field trip. Be sure to write the name of the species on the blank line at the top of the box.
4. Use your dunesland map to pin-point your location as you move through the dunesland.
5. During the course of your trip, Super Sleuth may ask you questions. You will have to figure out an answer and write it on the blank lines provided.
6. Start your trip by beginning to read.

Super Sleuth

your name _____

On this spring morning in the dunesland, you have met Super Sleuth on the beach. The sun is just peeking over the horizon, casting a sheet of yellow-orange over the lake. All around you, birds are singing.

"Ah, the dunesland is awake and alive," says Super Sleuth. "I hope you are awake too, because we have a lot of spy work to do."

"I'm ready," you say. "When do we start?"

"Right now," replies Super Sleuth as she points out over the lake. "I've spotted our first target. Can you see that bird?"

"Yes I can, it's flying up and down the shoreline. It is mostly white but its wings are light gray, tipped with black."

"Watch now," says Super Sleuth.

You look and see the bird hovering in the air. Then it dive-bombs into the water. There is a

(cont. on next page)

splash, and the bird lifts back into the air. A small fish is pi..ed in its bright red-orange bill. As is flies away, you notice it has a black cap. It is mystery species #1.

Mystery Species #1 _____

As you are finishing up with the identification of species #1, you hear a loud whistle coming from directly above you. Super Sleuth hears it too, and you both look up.

What you see is hard to make out because it is moving very high in the sky; however, you can see it is a darkly-colored bird. Its wings are open and it is sailing in big, sweeping circles. As you watch, it issues a long, shrill whistle that sounds like "whip-whee-ee-you."

"Why is that bird flying so high?" you ask your guide. "It can't be finding much food way up there."

"It's not looking for food," replies Super Sleuth. "It's performing a courtship flight to attract a mate. Keep watching, I think we may get to see it perform another feat."

You look back up at the bird and see it do an amazing thing. It folds in its wings, points its head down and shoots toward the earth like a falling star. Just when it looks as if it is going to crash, it swoops upward, opens its wings and then lands gently in the sand prairie. It disappears into the grasses before you get to see much, except that it has a long neck. It is mystery species #2.

Mystery Species #2 _____

After you finish identifying species #2, you and your guide take off down the pebble-covered beach. She tells you to keep your eyes peeled and your ears open.

You do just that and before long, it pays off. Up ahead, you see something moving and you point it out to Super Sleuth. She suggests trying to sneak closer.

You both start tip-toeing down the beach. Within a few minutes, your target is within full view.

"Look," you whisper to Super Sleuth. "It's a bird. It has a black bib on its white breast. See how it's walking from pebble to pebble and using its bill to turn each one over. It must be looking beneath the pebbles for food."

(cont. on next page)

"You are quite right, little spy. That bird is named for its habit of turning over stones to search for food. It is mystery species #3."

Mystery Species #3 _____

Once you have finished labeling species #3, you take one last look at it. It is standing still, staring at the sand. Then, all of a sudden, it jabs its bill into the sand. But it must have missed its target because a dark-green beetle is scrambling across the beach. The little beetle is quick but so is the bird. In no time, the bird has caught and swallowed the beetle. It was mystery species #4.

Mystery Species #4 _____

"Good deal," says Super Sleuth, as you paste in species #4. "We've seen a lot of animals so far this morning, but there aren't any plants for us to spy on here along the beach. Let's move inland, but before we do, I have a spy question to ask you about the beach. Look at all of these pebbles. Can you tell me how they came to be here?"

You check your Field Guide and answer," ____ _____."

After you have solved the pebble mystery, you and Super Sleuth cross the beach and climb onto the top of the primary dune. Beneath your feet, there is a thick carpet of beach merram grass. You bend down to investigate the grass and see a mystery species.

"Look, Super Sleuth," you say. "Check out this plant. Its branches are spreading out all over the dune. It has needle-like leaves and light-blue berries. It must be mystery species #5."

Mystery Species #5 _____

Just as you are finishing up with identifying mystery species #5, Super Sleuth grabs your arm. "An animal is coming," she whispers.

(cont. on next page)

You both crouch down behind some grasses and hold your breath. Sure enough, a bright, brown mouse is creeping toward mystery species #5. When it reaches the plant, it starts to nibble on the juicy berries. You see that the mouse has four white feet and a white belly. It is mystery species #6.

Mystery Species #6 _____

As you are watching the mouse feast on the berries, a shadow passes over the ground. The mouse sees it and scurries into a stand of little bluestem. You look up and see that the shadow belongs to a bird flying overhead.

"Why do you think the mouse ran?" Super Sleuth asks you.

You think for a moment and answer," _____ _____."

"I think you are right," says Super Sleuth. The mouse knows the bird is on the hunt. "It probably escaped into a burrow at the base of those grasses. It may have a nest and young hidden in the burrow."

"Let's watch the spot where it disappeared for a minute," you insist. "Maybe it will come back out."

"O.k., and while we are waiting, we can spy on that bird. It is still flying above us. I think it may be waiting for the mouse too."

"It is really a beautiful bird," you say. "I can see that it has many colors. It wings are blue but its back and tail are rusty-red. Its head is blue too, and I can make out two black stripes on the side of its face. I bet it is mystery species #7."

Mystery Species #7_____

While you are identifying mystery species #7, Super Sleuth continues to look-out for the mouse. Now, she is nudging you.

You look over and see the mouse peeking out from the grasses. Then you glance up and see the kestrel. It is hovering in the air now, watching the mouse. You look back down and see the mouse sneaking back toward the creeping juniper, but the mouse has eaten its last berry. The kestrel dives and nails it to the ground. Then, very quickly, the kestrel carries its prey up into the air and disappears into the branches of a black oak tree.

"Gee, Super Sleuth, what about the mouse's babies? Will they survive?"

"Probably not, but that's ok. The mouse has already raised a couple of litters this year. Small animals, like the mouse, always raise a lot of young because they are so heavily preyed upon by larger animals. It takes a great number of them to carry on their population. But they manage, and they perform a great service by providing so much food for the other animals in the ecosystem."

"What about the kestrel? Where do you think it took the mouse?"

"Let's sneak over to that black oak and find out."

(cont. on next page)

You and Super Sleuth quietly walk over to the trunk of the tree. When you look up, this is what you see.

After you have spied on the kestrel and its young for a few minutes, Super Sleuth pulls you away.

"Come on," she whispers. "We don't want to disturb the kestrel and its family. I think I have found the trail of an animal that we can spy on."

You follow your guide over to a bare spot on the ground.

"Look," she says. "See how the grasses have been beaten down into the sand here? This is the trail of an animal. Let's see if we can track it down."

You and Super Sleuth walk slowly down the trail toward the sand prairie. Before long, you see something lying in the trail and bend down to investigate.

It is the skull of a rabbit. You show it to Super Sleuth.

"That is an excellent clue," she says. "We know now that the animal we are tracking is big and powerful enough to tackle a rabbit. Let's keep going."

You and Super Sleuth continue on the trail. You cross the tertiary dune and step onto the sand prairie. As you walk, you find more clues along the trail, bits of fur, feathers and even the back leg of a rabbit.

Suddenly, you see something up ahead and you grab Super Sleuth's arm. She sees it too, and you both crouch down. It is a big animal. It is mostly yellowish-red in color, but its belly and throat are white. All four of its feet are black. It is mystery species #8.

Mystery Species # 8 _____

While you are identifying mystery species #8, you are careful to work very quietly. But when you finish and look back up, you drop your field guide and it falls to the ground, making a rustling noise in the grass.

The fox jumps and stares straight at you. You freeze and start to tremble. The fox looks scared too. It quickly jerks its head around, looks in all directions and then, in a flash of red, whips its bushy tail and scrams.

"Relax, little spy, that animal is many times more afraid of us than we are of it. Let's walk up there and see what it was up to."

(cont. on next page)

You find the spot where the fox was and find a plant. Its green leaves are shaped like little pads, and they are covered with prickly white spines. It is mystery species #9.

Mystery Species #9 _____

"Look here," says Super Sleuth. "This is the fruit of species #9. It is shaped just like a pear. See how a big chunk has been ripped out of it. What do you think happened?"

You think about the fox and the evidence of its enormous appetite that you saw along the trail and answer, " _____ _____."

While you are solving the mystery of the prickly pear cactus fruit, Super Sleuth has been walking across the sand prairie. When you catch up with her, you find that she is standing very still, frozen in her tracks.

"Ssssh," she whispers, and points to the ground.

You look down and see a big, yellow-to-tan snake. Its back is covered with dark blotches. It is mystery species #10.

Mystery Species #10 _____

While you are identifying mystery species #10, it does a frightening thing. It blows up its body with air and flattens its big neck. Then, it starts hissing loudly and striking. It looks for all the world like a deadly cobra.

"Maybe we should get out of here," you whisper.

"Hang on just a minute. I think this snake may be just one heck of a poker player."

"POKER PLAYER," you think in amazement. "Here we are, a snake is striking at us and my trusty guide is talking about cards. Has she gone crazy?"

"Just watch," Super Sleuth begs you.

You decide to watch for about 30 more seconds and while you do, the snake does something very surprising. It stops hissing and flops over on its back. There it lays limp and still. It even opens it mouth and hangs out its tongue as if it has taken its last breath. It must be dead. Did we kill it just by watching it, you think in alarm.

Then Super Sleuth lets out a big laugh. "Come on," she chuckles. "I think we've inconvenienced this snake long enough. You see, it was just play-acting when it was trying to look like a deadly cobra. It was trying to frighten us away. When that didn't work, it tried another ploy, playing dead. That's why I called it a poker player. It tried to bluff us out, not once but twice. Can you think of how the snake's poker-playing ways might be

(cont. on next page)

helpful to it when it is approached by an animal that wants to attack it?"

You think about a big owl getting ready to attack the snake and answer, " _____ _____."

After you answer the question about the snake, you join Super Sleuth who is sitting down in the grass, eating a sandwich. You take out your sandwich and start to take a bite when Super Sleuth taps you on the knee.

"Hey, little spy," she whispers. "You are not the only one getting ready to have lunch. Look over on that blade of grass."

You check out the spot Super Sleuth is pointing to and see a small ball of silk. A yellowish-brown spider is hanging half-way out of it wrestling with a fly. The fight is a big one, but the spider finally manages to clamp its long jaws around the fly. Then, it pulls the fly into its web. For a few moments, the web shakes violently. Then it is still. The triumphant spider is mystery species #11.

Mystery Species #11 _____

"Gosh," you say to Super Sleuth after you finish identifying mystery species #11, "I'm glad I don't have to work so hard to get my lunch."

"Yes, me too," she smiles, "this spy work can take a lot of out of a person. I think I'll just lay back and doze under the dunesland sun."

"Sleep tight, Super Sleuth."

Your Spy Report on the Dunesland

Use your **Spy Manual** to help you answer these questions about what you saw during your Field Trip. Write your answers down on a separate sheet of paper.

1. Based upon your spywork, do you think the plants and animals in the dunesland live together in an ecosystem? Explain your answer.
2. Which two mystery species did you find that had fruits? Do you think the two species were using the process of photosynthesis to make food molecules in their fruits? If so, explain how they do it.
3. What was the name of mystery species #5? What animal ate the berries of species #5? What animal captured the animal that ate the berries?
4. Your answers to question 3 should be: creeping juniper, white-footed mouse, and American kestrel. The passage of food from the creeping juniper to the mouse, and finally to the kestrel, is called what? Explain two of the other food chains you found during your field trip, even if you only saw two links in each chain.
5. If you combined all of the food chains in the dunesland, what would you have?
6. In addition to food, plants provide shelter for animals. During your trip, which plant provided cover for the white-footed mouse? What plant was sheltering the nest of the American kestrel?
7. Define the word "niche." Described below are the niches of two animal species and one plant species. You saw these species during your trip. What are their names?

   Niche: The special place of this species is the sand prairie along the primary dune. Its role in the dunesland is to hold the sand in place and provide food for animals.

   Niche: This species' special place is in the sand prairie, where it hides its nest in a grass-covered burrow. Its role to play includes feeding on seeds and berries and serving as food for larger animals.

   Niche: This species' special place is in the savannah where it keeps a nest in tree branches. Its role to play is hunting small animals.
8. Based upon your answers in this report, would you say that every plant and animal species is important to the well-being of the dunesland ecosystem?

DAY 5 - Making Decisions About the Dunesland

MISSION

Make land-use decisions about how you think the dunesland should be used and treated.

INSTRUCTIONS

Read the information below and complete Work Steps 1-5.

For most of the plants and animals living in Illinois, destruction of their habitat is the biggest problem they face. Each year, more of our forests, wetlands, and prairies are cleared to make room for buildings, housing subdivisions, and highways. As each acre falls to the axe or bulldozer, plants and animals are left homeless.

Fortunately, the plants and animals living in the dunesland are not threatened by a loss of their habitat. As part of Illinois Beach State Park, the entire dunesland is preserved by law. But that doesn't mean the dunesland plants and animals are protected from all of the problems that can jeopardize the *quality* of their habitat. After all, they share their precious habitat with us, and our actions can conflict with what is best for the dunesland.

Let's look at one example of how our actions are threatening the well-being of the dunesland. For many years, people in the states bordering Lake Michigan have been constructing buildings, harbors, and roads along its shoreline. To do that, they have dug up and carried away a lot of the shoreline sand. This removal of sand has robbed the lake of its natural supply of sand and caused serious problems for the Illinois dunesland.

You know that the foundation of the dunesland is its sandy soil. Its dunes are shaped with sand, and its prairies and savannah are bedded with sand. In short, the dunesland must have sand to be a dunesland. Fortunately, Lake Michigan is a good provider of sand. As each wave rolls onto the beach, it delivers more sand to support the dunesland. However, the same waves, as they roll back out into the lake, also take away sand. There is a constant give and take of sand between the lake and the dunesland.

If Lake Michigan's supply of sand is good, it can give the dunesland just about as much sand as it takes away. But if the lake is short on its supply, it begins to take away more sand than it brings in. Gradually, the dunes begin to melt or "erode" into the lake. It's a process called erosion.

A certain amount of erosion is normal along the dunesland shoreline. However, when people take away large amounts of sand or interrupt the flow of sand down the shoreline, the rate of erosion increases and little by little, the sandy foundation of the dunesland slips away into the lake.

It's easy to understand how plants and animals suffer from erosion. As the dunesland washes away into the lake, they lose their homes. Plants growing along the dunes lose their footholds and die. Animals suffer a double blow. They are left without plants for food and shelter and without soil in which to burrow.

In addition to erosion, there are several other problems in the dunesland that are a result of our activities. One is caused by the heavy recreational use of the dunesland. Persons driving off-the-road vehicles through the dunesland tear up the habitat, cause sand erosion, and run over plants and animals. Another problem is water pollution in Lake Michigan. Pesticides and other pollutants pouring into Lake Michigan from fields and factories poison plants and threaten the feeding grounds of the dunesland species that eat fish.

While it is true that our actions can cause serious problems for the dunesland, it is equally true that we can take steps to correct the problems. Unlike the plants and animals that we share the dunesland with, we have the power to make decisions about how the dunesland is used and treated. Because we have that power, it is up to us to care for the dunesland and the rest of our natural environment. We can do that by making land-use decisions that will best alleviate any problems that we have caused and preserve the quality of the habitat in the dunesland.

Making land-use decisions to benefit the dunesland is not always an easy task. Many times, we have to decide what is more important. For example, is it more important to give people who enjoy operating off-the-road vehicles an opportunity to drive through the dunesland, or is it more important to protect the dunesland habitat by banning the use of off-the-road vehicles? For many people, that could be a tough decision to make. Some might favor the use of ORVs; others might want to ban ORVs. But no matter how difficult the decision, the important thing to remember is that we, the people, are the only ones that can make it.

Work Steps

1. On a separate sheet of paper, explain how the actions of people have caused the problem of erosion in the dunesland. Why do plants and animals suffer from erosion? Explain two of the other problems threatening the dunesland that are caused by people.
2. Why are we responsible for caring for the dunesland and the rest of our natural environment? How can we do that?

3. A plant or animal species belongs in each of the four boxes below. In the first three boxes, there are clues to the identity of the species that belong in the box. (For now, don't worry about doing anything with the fourth box.) Check your field guide and find the correct species for each of the first three boxes. Cut those species out and paste them into their boxes.

4. Now that you have placed species in each of the first three boxes, it is time for you to make some land-use decisions. You see, each of those species is affected by problems that threaten the dunesland. It is up to you to look at their needs and weigh them against the needs and actions of people Then, you will have to make a decision. As you learned in the information above, land-use decisions are not always easy to make and there is not always a winner or a clear-cut solution. As you make the three decisions described below, remember that there is no right or wrong answer. Just make the decision you *feel* is best.

   Decision #1 In the first box, species #12 is shown. Species #12 is a rare and endangered species in Illinois. In the bare sand of the beach, it scratches out a little hollow for its nest and lays its eggs. Knowing those facts about species #12, do you recommend that the operation of off-the-road vehicles be forbidden or allowed in the dunesland? On a separate sheet of paper, write down your decision and explain the reasons why you made that decision.

   Decision #2 Species #13, in the second box, is a bird that hunts over Lake Michigan for fish and insects. With that in mind, which of these two decisions do you recommend: 1. People should pass and abide by laws designed to stop the flows of pesticides, garbage, and other pollutants into the lake; or 2. Factories, farmers, and individuals should decide by themselves if they want to release pollutants into the lake. Write down and explain your decision.

   Decision #3 Species #14 is an endangered plant that lives in Illinois only in the dunesland. It takes root and grows along the primary dunes. Knowing that, do you recommend restricting the removal of sand by people along the Lake Michigan shoreline? Do you rather favor a policy that would allow companies and persons to remove as much sand as they need to build buildings, roads, and marinas? Write down and explain your decision.

5. Species #15, in the fourth box, is a species that depends upon the dunesland as a part of its natural home. In the dunesland water, this species swims. On its beach, this species lies in the sun, flies kites, and plays frisbee. This species also loves to visit the dunesland to study and enjoy its wild areas, plants, and animals. Knowing that about species #15, do you recommend that we do everything we can to preserve the dunesland as a top-quality, special habitat in Illinois? Write down and explain your answer.

calls a soft "peeplo".	has a black ring on its bill.	has gray heart-shaped leaves.	
Species #12	**Species #13**	**Species #14**	**Species #15** **Human being**

Chapter 3

Urban Habitats In Illinois

Dear Student:
In Chapter 2, you studied the dunesland, a special habitat found in just one corner of Illinois. In this chapter, your assignment is to investigate another kind of special habitat. This habitat is many times more common than the dunesland. In fact, this habitat is found in every Illinois city, town, and backyard. It's called urban habitat.

Your work in this chapter will take you approximately eight days. So, gather up your Spy Manual, a pair of scissors, a jar of paste, and a pencil and get started.

DAY 1 - Discovering the Nature of Urban Habitats

MISSION

Find out about the wild places in cities and towns.

INSTRUCTIONS

1. Study carefully the scene drawn below.
2. Complete Work Steps 1-6.

Work Steps

1. In the scene drawn above, there are many plants and animals. Do you think the environment shown in the scene is providing a habitat for those plants and animals? _____ Check your Spy Manual for the definition of habitat to help you with your answer.

2. If you answered "no" in Work Step 1, complete this Work Step and see if you still agree with your answer. If you answered "yes", let's test your answer.

   In the scene, the bird perched high in the tree on the right is an eastern-screech owl. This owl is a fierce hunter and can catch all kinds

of small animals. It keeps its nest and owlets in the hollow of a tree. When not hunting or tending its young, the owl perches in trees where it can be camouflaged by the bark.

Do you see any places in the scene that could provide cover for the eastern screech owl and its young? If so, describe them. _____ _____.

Do you see any animals in the scene that the owl could catch and eat? _____ If so, which ones? _____ _____.

Is there a place in the scene where the owl could find water?

Based upon your answers to those questions, do you think the environment shown in the scene is providing a habitat for the eastern screech owl? _____ Explain your answer.

_____
_____
_____
_____.

3. Now that you have completed Work Steps 2 and 3, you should know that the environment shown in the scene is indeed an excellent habitat for plants and animals. But where do you think this particular habitat is located? Do you think this habitat is located in a forest or in a city? _____ Examine the scene very carefully and see if you can find any clues.

4. If you answered that the habitat is located in a forest, you are partly correct. The habitat is like a forest habitat because there are many trees and shrubs. But, if you said the habitat is located in a city, you are completely correct. If you haven't already noticed these clues, look along the tops of the trees in the scene. Do you see the chimney of a house peeking over the trees? _____ Also, look in the upper left hand corner of the scene. Can you make out the power line that is leading to the house with the chimney? _____

You see, this scene is showing a natural habitat that is located right in the middle of a city. In fact, the habitat is situated in someone's backyard. Because of its location, this habitat is called an urban habitat.

5. Urban habitats are not always made up of trees and shrubs. There are also grassy and wetland urban habitats. Any urban area that has natural vegetation, no matter its size, is an urban habitat. There are many urban habitats in Illinois' largest cities, but there are also many urban habitats located in our smallest towns. The one thing all urban habitats have in common is that they are found in the same areas where people live. Few of us live near the Shawnee National Forest, which is the largest forest habitat in Illinois. However, all of us live near urban habitats because they are part of our cities and towns. Those of us who have yards actually live right in the middle of urban habitats.

Think about the areas that you have seen in the community where you live. Then place a check in front of each of the following areas that you think is an urban habitat.
_____ vacant grassy lots; _____ wooded parks; _____ golf courses; _____ cemeteries; _____ the grassy strips of land alongside railroad tracks; _____ parking lots; _____ yards; _____ the grassy or wooded land along streets; _____ shopping malls; _____ lakes; _____ streams; _____ rivers; _____ ponds; _____ marshes.

6. If you checked all of the places listed in Work Step 5 except for parking lots and shopping malls, you are correct. In all of the other places, plants, and animals find a habitat that offers cover, food, and water. You can see from the list you just made of urban habitats that one type of habitat can be very different from another type. The environment in a wooded park is not the same as the environment in a vacant lot, but plants and animals live in both. Using what you learned in Work Step 5, circle the symbol below that best shows what all urban habitats, as different as they may be, have in common.

DAY 2 - Building A Guide to People in Urban Areas

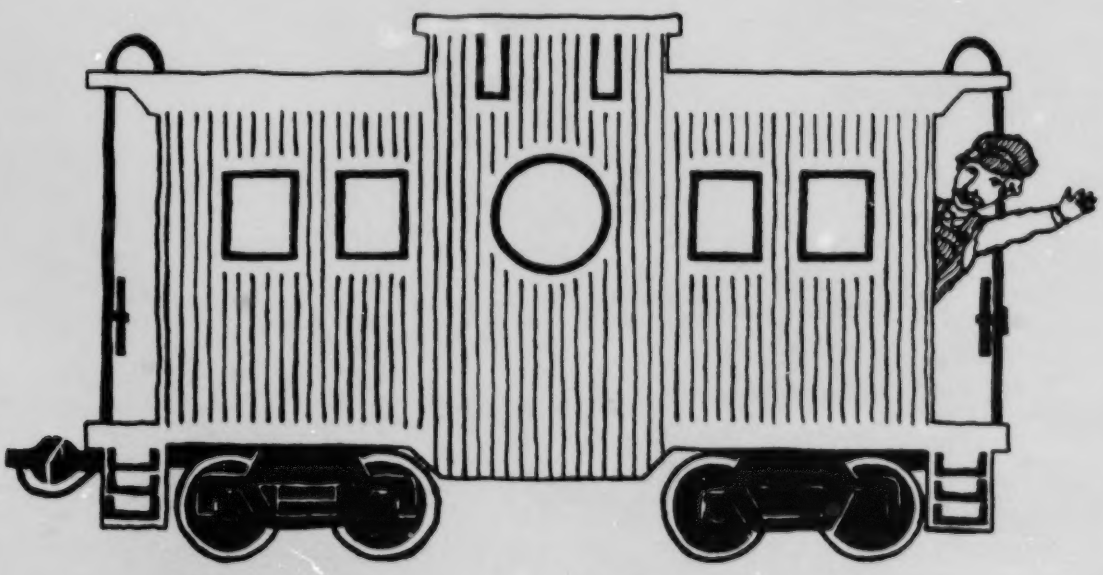
MISSION

Check out how people use and enjoy urban habitats.

INSTRUCTIONS

Because urban habitats are located in cities and towns, they are not just wildlife habitats, they are people habitats as well. We all live near, enjoy, and use urban habitats. Each of the drawings below shows one of the activities people do in urban habitats. On the blank line beneath each drawing, write what that particular activity is. To help you get started, one of the drawings is already labeled.

A teacher and a student studying urban wildlife.



TAXI

DAY 3 - Building An Urban Field Guide

MISSION

Create your own Field Guide to twenty-nine species of plants and animals that live in urban areas.

INSTRUCTIONS

1. Listed below are descriptions of 29 plant and animal species. Read each description carefully. Then, using what you have learned, find the drawing of that species in the Field Guide on pages 28-30. Write the names of the species on the blank line beneath or beside the drawing. There will be at least one clue beside the drawing to help you make the match.
2. After you have finished your Field Guide, turn your attention to the Mini-Guide on page 31. All of the animals in your Field Guide are shown in the Mini-Guide. Label those animals, because you will need the Mini-Guide to complete your assignments for Days 4-7.

Special Note: Three of the most common urban birds--house sparrow, European starling, and rock dove (domestic pigeon)--are not included in this Field Guide because they are not native to Illinois. They were brought to North America from Europe during this century. These non-native birds are not picky and can live just about anywhere in an urban area. You've probably seen house sparrows picking at the trash left in parking lots and nesting in the eaves of houses. Our native birds are much more finicky and need the natural food and shelter found only in high-quality urban habitats. If, someday, all of the wildest places in our cities and towns are destroyed, our native animals will vanish but the house sparrow, European starling, and rock dove will probably still be around. It is your goal in this chapter to learn about how we can protect the quality of urban habitats so that all of the animals native to this land can survive.

PLANT DESCRIPTIONS (H=Height)

big bluestem: The stems and leaves of this tall-growing grass are green. The seed head of its flower branches into three parts, looking something like a turkey's foot. H up to 8'.

sugar maple: The scaly bark of this large tree is gray to dark brown to black. The leaves are dark green above and pale green below. Its winged fruits are born in pairs. H up to 80'.

gray dogwood: This gray-barked shrub has slender twigs, green leaves and small, white flowers and berries. H up to 10'.

ragged evening primrose: This tall flower has green leaves and a large yellow flower. H up to 2'.

white oak: The bark of this large tree is gray or whitish with gray patches. It has long, green leaves, and its fruit is a brown acorn. H up to 100'.

red cedar: This medium-sized tree has reddish-brown bark that splits into long shreds. Its green leaves are needle-like, and its fruit is a dark-blue berry. H up to 90' but usually much smaller.

bluebells: This lovely wildflower has blue, trumpet-shaped flowers. Its leaves are smooth, green and oval-shaped. Clusters of wrinkled nutlets are the fruits of bluebell. H up to 2'.

field thistle: This wildflower has tall, hairy stems and large, round, pink flowers. H up to 8'.

trumpet creeper: The woody vine of this plant stretches up to 30 feet long. Its scarlet-to-orange flowers are shaped like trumpets. Its leaflets are small and green.

common blackberry: This shrub has long, prickly stems and green leaflets. The white flowers mature into black, juicy berries.

ANIMAL DESCRIPTIONS (L=length; W=wingspan)

American toad: This brown-to-olive toad is marked with dark spots. Its skin is warty, and it lives near shallow bodies of water. L 2-3½"

eastern garter snake: This slender, green snake has three yellowish stripes running down its body. It is a common inhabitant of wooded and grassy areas, especially those near water. L 18-26"

eastern black swallowtail: This butterfly is black to blue-black with black lines and white dots. There is a blue cloud on each of its outer hind wings, as well as a bright orange spot with a black center. It inhabits grassy areas and water courses. W 2⅜-3½"

golden shiner: This fish has a greenish-olive back and golden or silvery sides. It lives in ponds, lakes, swamps, and small streams. L 3-5"

eastern screech owl: This small, reddish-brown owl has two ear tufts on the top of its head. It inhabits wooded areas. L 8" W 22"

chipping sparrow: This sparrow has a brown back and wings streaked with black. Its underparts are gray. Good field marks are its bright rusty cap, white eyebrow, and the black stripe through its eye. It lives in grassy areas and open woodlands. L 4¾"

common flicker: This long-beaked woodpecker has a brown back and wings barred with black. Good field marks are its black moustache (male

only), black bib, red band on neck, and gray cap. When flying, it can be told by its large, white rump and yellow underwings. It lives in open woodlands. L 10½"

black-capped chickadee: This black-capped bird is gray-black above and whitish-tan below. Told by its black bib and white cheeks, it sticks close to areas with trees. L 4½"

eastern chipmunk: This mammal has a long, bushy tail and a rusty head, flanks, and rump. Its sides are brown and its back is gray. A tan stripe, bordered by black, runs down each side of its body. It stays close to the ground in wooded areas. L 9½-11¼"

eastern cottontail: This rabbit is buff to rusty brown above and white below. Its white, powderpuff tail is its best field mark. It prefers to live in grassy areas. L 15½-18"

thirteen-lined ground squirrel: This big-eyed squirrel has a long tail and about 13 stripes running down its body. Half of the stripes are dark brown, the other half are buffy-colored. All of the brown stripes are dotted with buff spots. Its sides and belly are tan. It is at home in just about every kind of grassy area, especially if the grass is fairly short. L 8¾-12¼"

American goldfinch: This brightly colored bird is told by its black cap (male only), yellow back and belly, and black wings and tail. It inhabits grassy and open wooded areas. L 4¼"

blue jay: This bird is blue above and grayish-white below. The best field marks are its blue crest and black necklace. It inhabits open wooded areas. L 10"

common yellowthroat: This olive-brown warbler is best told by its black mask (male only) and bright-yellow throat and breast. It is always found close to water in an open grassy or shrubby area. L 4¼"

meadow vole: This short-tailed animal is brownish-gray above and yellowish-rust below. It lives in grassy areas. L 3⅜-4½"

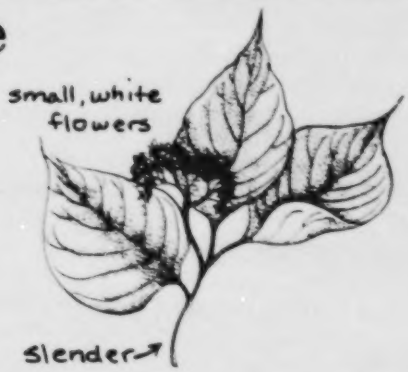
eastern gray squirrel: This bushy-tailed squirrel is gray above and grayish-white below. There is a slight overlay of yellow on its sides and legs. Though it ventures out into lawns, it is never seen very far from trees. L 16-20"

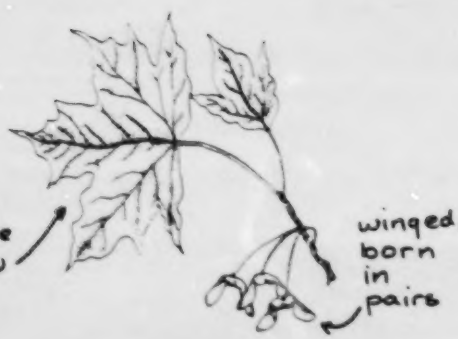
bluegill: This small-mouthed fish is dark olive-green, and its chin and lower gill covers are blue. It lives in well-vegetated lakes, ponds, and streams. L up to 12".

house wren: This small bird is rich-brown above and buffy-brown below. A good field mark is its tail, which often points straight up. It inhabits wooded areas. L 4¼"

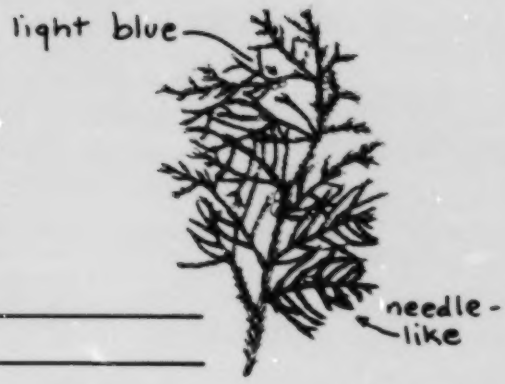
garden spider: This brownish-orange spider has dark-brown bands around its body and legs. It is a common resident of backyards, where it spins its web in the branches of shrubs. L ¼-¾"

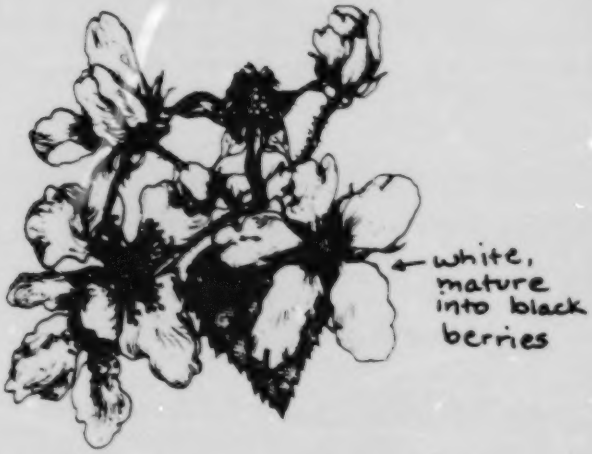
Urban Field Guide



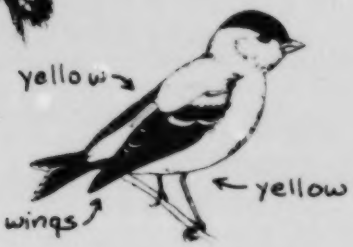


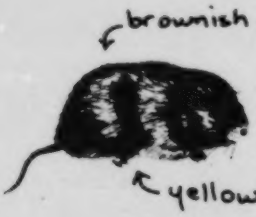
Urban Field Guide

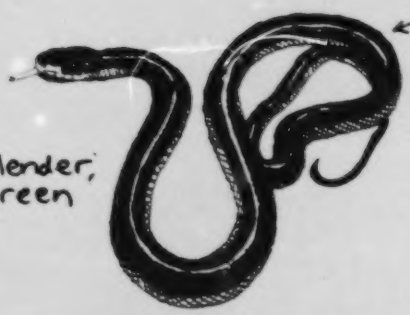




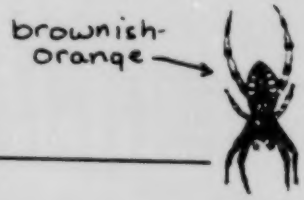
Urban Field Guide

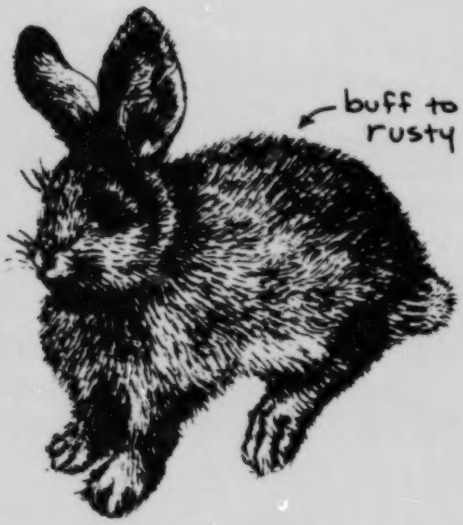


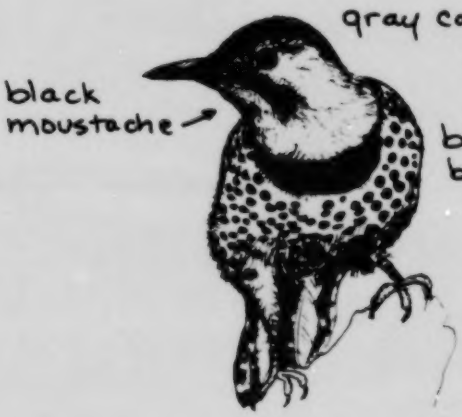


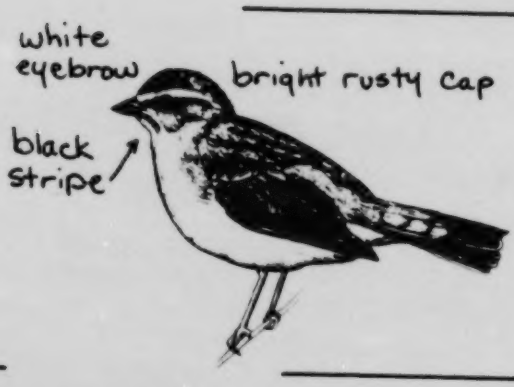


Urban Field Guide



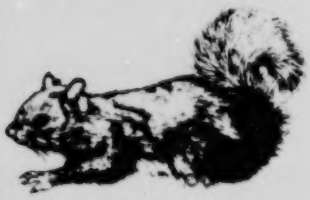


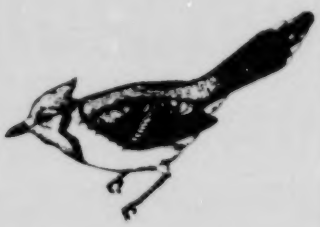


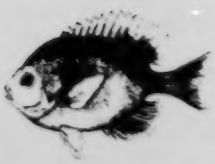


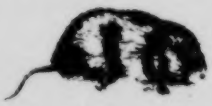
Urban Mini-Guide

When cutting out animals, do not cross center line.









DAY 4 - Investigating Urban Grassy and Water Habitats

MISSION

Complete a model of a grassy/water habitat.

INSTRUCTIONS

1. Study carefully the Grassy/Water Habitat Model on page 35.
2. Gather up your **Guide to People in Urban Habitats, Field Guide to Urban Plants and Animals,** and **Mini-Guide.** Using those three guides and your **Spy Manual,** complete the Work Steps below.

Work Steps

1. The model on page 35 shows two types of urban habitats. In the middle of the model, there is a pond or water habitat. Around the pond, there is a grassy habitat. Rivers, lakes, ponds, marshes, creeks, and other water habitats are a part of every urban environment. Grassy habitats are also common in urban areas. They can be found in vacant lots, cemeteries, yards, parks, and along streets and railroad tracks.

   Think about the community where you live. Then, on a separate sheet of paper, list the locations of as many water and grassy habitats you can think of.

2. Since both of the habitats shown in the model are open spaces, there are no trees shown in the model. Instead, there are many smaller, sun-loving plants, both in the water and on land. The tall water plants on the left are common cattails. The water plant with the lily pods on the right is American lotus. Using your Field Guide, try to pinpoint some of the land plants shown in the model. If you look carefully, you will see ragged evening primrose, big bluestem, and blackberry.

3. Can you spot an animal in the model that is hiding in the grass? If so, check your Field Guide for its identity and write its name here.

   _____

   That hidden vole is just one of the many animals that live in grassy and water habitats. It is your job to find seven more animals in your Field Guide and place them in the model. Here are your instructions.

   Listed below are clues to the identity of the seven animals. Using the clues, find each of the animals in your Field Guide. Be sure to choose only the animals that live in grassy or water habitats. Label each animal on the blank line following the clues. Then cut the animal out of the Mini-Guide and paste it onto the model in whatever location you think would be good for its lifestyle. The animals will appear larger than in real life, but that is so you can work with them easily.

   A. A bird with a bright rusty cap _____ Place in the tall grasses that are sheltering its nest.

   B. A butterfly with blue clouds on its outer wings _____ Place in the air above the ragged evening primrose.

   C. A fish with a small mouth and blue gill covers _____

   D. A golden or silvery fish_____

   E. A brown to olive amphibian _____

   F. A slender, green reptile _____

   G. Brown-olive warbler with bright yellow underparts_____

4. As you learned during Day 2, urban habitats are not just places for plants and animals; people use them too. To finish your map, find four people that match the descriptions below in your Guide to People in Urban Habitats. Cut them out of the Guide and paste them onto the model wherever you think they should be.

   A. A person fishing.

   B. A teacher and a student studying an urban habitat.

   C. A person playing ball with a catcher's mitt. *Note: Place this person in the model so that she can catch the ball flying through the air.*

5. Now that you have completed a model of a grassy water habitat, you can see a lot of action going on in the habitat. People are playing, fishing, and learning about nature. The plants and animals are also going about their lives. Using your Spy Manual, answer the questions below about what some of the plants and animals are doing.

   A. The chipping sparrow eats plant seeds and insects. Which animal in the model might the chipping sparrow eat? _____

   B. All of the plants in the model are busy building food molecules in their fruits, flowers, and leaves. Check your Manual for the definition of photosynthesis, and complete the story below about how one of the plants, the blackberry, is making food. But, before you start, make sure you have pinpointed the blackberry plant in the model. Using _____ as energy, the blackberry combines _____

and _____ in the presence of _____ to make glucose or _____ molecules. Those food molecules are then stored in the blackberry's _____, _____, and fruits.

C. What part of the blackberry plant do you think the common yellowthroat might eat? _____ What part do we eat? _____

D. All of the plants are also at work building seeds so that they can reproduce. In order to do that, they need to undergo the process of pollination. Check your Manual for the definition of that process. What insect in the model helps plants conduct pollination? _____

6. Based upon your work for this day, do you think grassy and water urban habitats are valuable to plants and animals? _____ And to people? _____ Explain your answers: _____

7. If you answered "yes", to Work Step 6, you must believe that grassy and water urban habitats are important places. In your community, which of the following actions could you and other people do to protect and care for grassy and water habitats?

_____ Keep grassy and water habitats wild by not clearing them.

_____ Forbid the dumping of garbage and litter in them.

_____ Tear up the nests of animals in them.

_____ Clean up any garbage that is dumped in them.

_____ Work to protect their water from pollution.

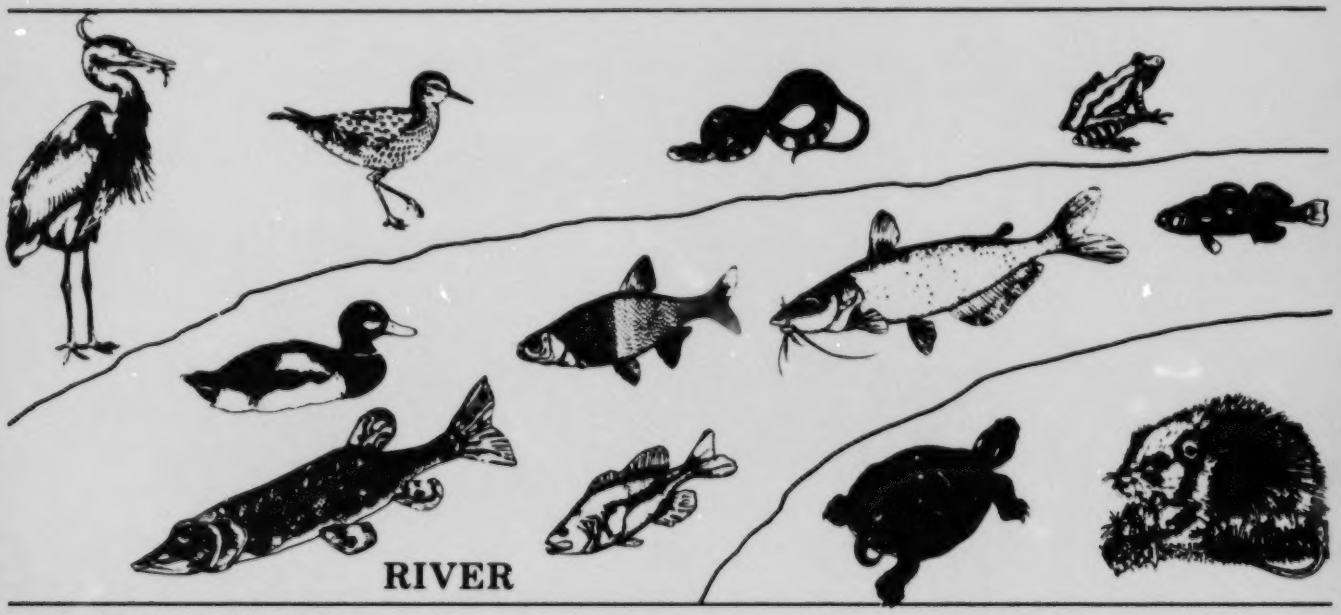
_____ Shoot animals with B.B. guns.

_____ Prohibit the harrassment or illegal shooting of animals.

_____ Throw bottles, cans, and old tires in them.

_____ Cut down all the vegetation.

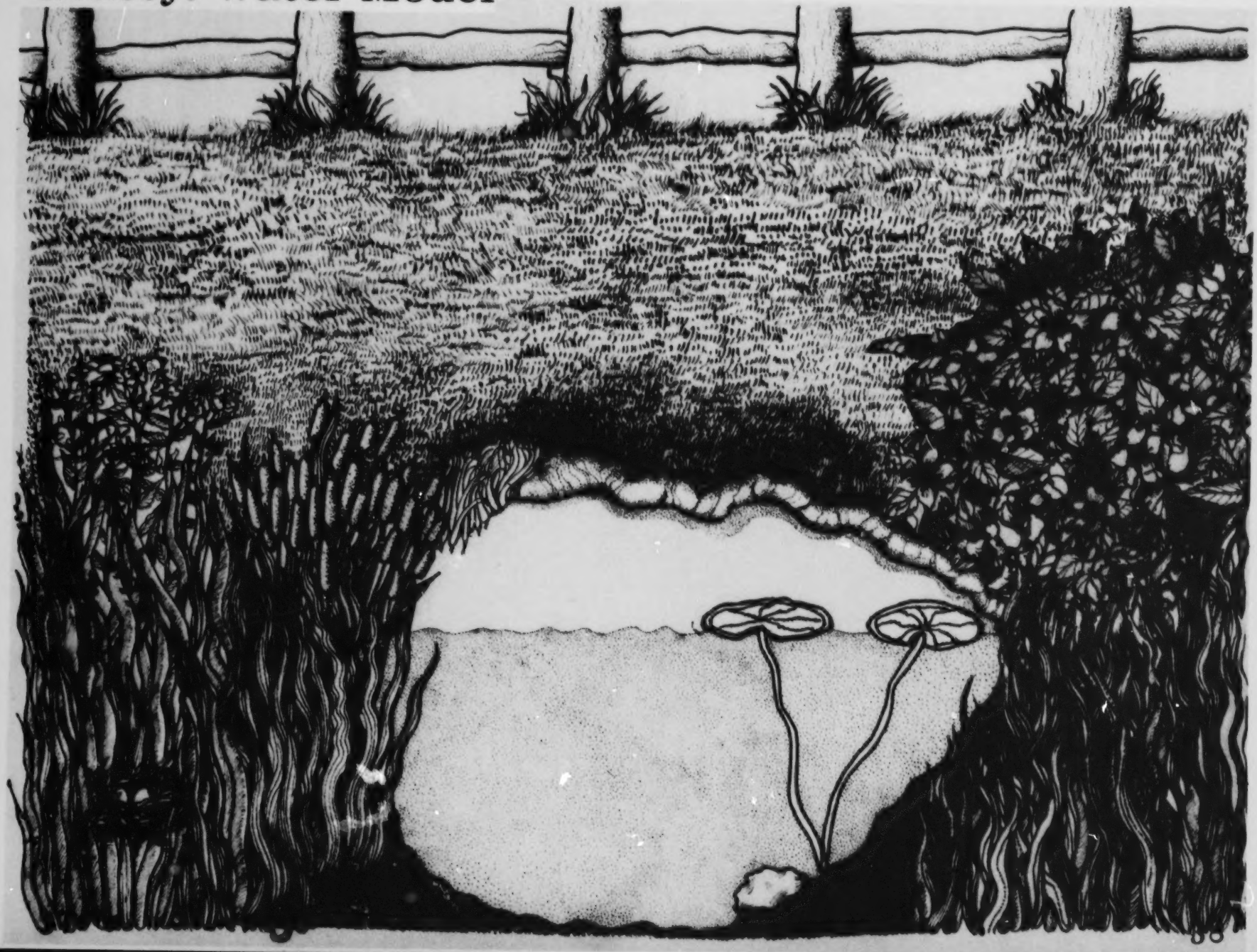
8. Shown below is a diagram of a river that runs through a city. Some animals that live in or by the river are also shown. Beneath the river diagram, there is a list of solid waste products that are routinely dumped into the river. Have you ever seen any of these waste products along the shore or in the water of a lake, pond or river in your community? For each waste product that you have seen or heard of polluting a waterway, put a large red "X" mark across one of the animals in the diagram. Once you are done, you will be able to see how the things that are thrown or released into waterways add up until the habitat can no longer support many plants and animals. And remember, since we get our water from local waterways, pollution is a terrible problem for people as well. That is why we all need to work to keep our water clean.



WATER POLLUTANTS

bottles
cans
cigarettes
sewage
cigarette lighters
plastic six-pack holders
combs and brushes
siltation from cropland
industrial wastes
old tires
styrofoam food containers

Grassy/Water Model



DAY 5 - Investigating Wooded Parks

MISSION

Complete a model of a wooded park habitat.

INSTRUCTIONS

1. Study carefully the wooded park model shown on page 38.
2. Follow the same directions given under #2 for Day 4.

Work Steps

1. In the community where you live, do you visit or know of any wooded parks? If so, on a separate sheet of paper, write down the locations of all the parks that you know of.
2. Trees, shrubs, and wildflowers are the most common plants in wooded parks. Using your Field Guide, pinpoint the four plants shown in the model. They are: white oak, sugar maple, bluebells, and gray dogwood.
3. Check out all of the places in the model where you think animals could find shelter. Do you see the bird peeking out of its nest cavity? _____ If so, use your Field Guide to identify that bird, and write its name here.

   _____

   There are other animals in your Field Guide that commonly live in wooded parks. Listed below are clues to the identity of four of them. Study the clues and find the four animals in your Field Guide. Write the name of each animal on the blank line following the clues. Then cut each animal out of your Mini-Guide and paste it into the model in the locations indicated.

   A. A gray, bushy-tailed mammal that is about 16-20" long. _____ Place it in the model so that its front feet are just above the acorns it is burying at the foot of the white oak tree.

   B. A rusty and gray-colored mammal that has a tan stripe bordered by black running down each side of its body. _____ Place this animal on the fallen log that is sheltering its nest and young.

   C. A small, black-capped bird that is gray-black above and whitish-tan below. _____ Place this species on a branch of the sugar maple.

   D. A reddish brown bird that has two tufts on its head. _____ Place this bird on a branch in the white oak tree.

4. Now it is time to add another important species to your model. In your Guide to People in Urban Habitats, find four human beings that match the descriptions below. Cut them out and place them in the model so that they can enjoy what they are doing.

   A. A person watching birds with a pair of binoculars.

   B. Two people having a picnic.

   C. A person hiking with a backpack and a cane.

5. Have you ever visited a wooded park? _____ Have you ever gone to a wooded park to watch animals? _____ Hike? _____. Or have a picnic? _____ If you have done any of these things, you know that a wooded park can be one of the most beautiful and fun places in a town or city.
6. Listed below are the food requirements of the animals in your model. The first entry (A) describes the food of the animals that eat only, or mostly, plant material. On the blank line, write the names of the plants shown in the habitat that those animals could eat. The second entry (B) describes the diet of a major meat-eating predator shown in the model. On the blank line, list the animals in the model that the predator could catch and eat.

   A. Eastern gray squirrel, eastern chipmunk, black-capped chickadee, and common flicker: the seeds, leaves, and berries of plants. _____

   _____

   _____

   B. Eastern screech owl: all types of small animals. _____ _____

   _____

7. Your answers in Work Step 6 should tell you that the food in the wooded park is first produced by plants and is then passed from animals who are then eaten by larger and more powerful animals. What is the flow of food from one plant to an animal and then to another animal called? _____ If you combined all of the food chains in the wooded park, what would you have?

   _____

8. Based upon your answers in Work Steps 6 and 7, do you think that each plant and animal species is important to the well-being of the wooded park ecosystem? _____ On a separate sheet of paper, explain your answer.
9. Since wooded parks are a part of the communities where we live, we are responsible for making decisions about how they are used and treated. Pretend you are a member of the Parks Commission where you live. On a

separate sheet of paper, make a list of all of the things you think the people in your community should do to conserve wooded parks so that they can provide a healthy habitat for plants, wildlife, and human beings. Be sure to explain why you think your ideas are important.

10. In Work Step 9, you prepared a plan to conserve wooded parks that are owned and managed by the public. In all communities, however, there are wooded areas that are owned by private individuals. While many private landowners work hard to preserve their land, others convert their land to farmland or sell it to development companies. These companies clear the land and build roads, shopping centers and house sub-divisions. The end result is a loss of natural habitat and that is a critical problem for wildlife and people.

    The map below shows a large, privately owned forest as it appeared in 1970. The forest provided a home for hundreds of plants and animals and was enjoyed by many people.

    In the area to the right of the map, there are symbols for three roads, a shopping center, and a housing sub-division. All of those developments were constructed in the forest during the period between 1970 and 1975. Cut those symbols out and paste them onto the forest map in the areas indicated. Once you are done, you will be able to see how the once large forest was all but destroyed in just a few years.

11. Since 95% of the land in Illinois is privately owned, natural habitats, like the forest in the map, are continually being sold and developed. Our challenge, if we want to preserve natural areas, is to convince landowners to save at least some of their land from development. Place a check in front of each of the following that you think could help persuade landowners to preserve their land. Then discuss with your class why you think each item you check could help. Also, discuss with your class what you will do with any land that you might own when you grow up. After all, it is up to each of us to care for our Illinois land.

    ___ Give landowners a break on their property taxes if they keep their land in a natural condition.

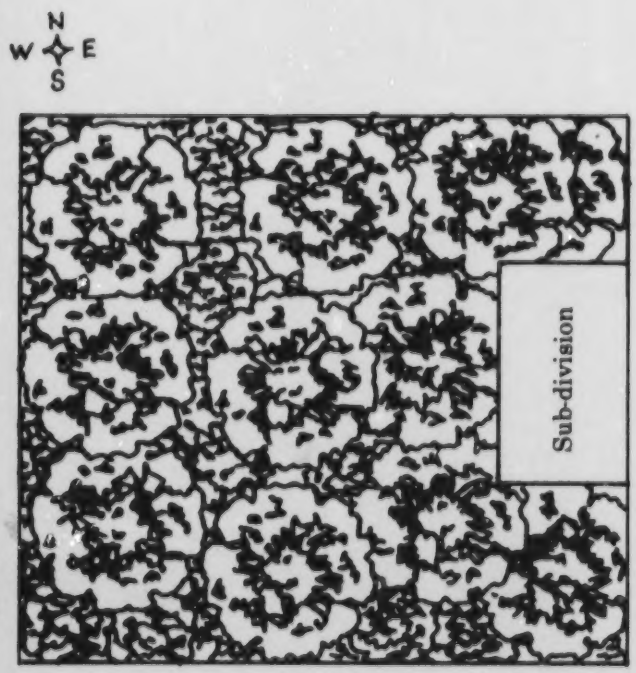
    ___ Charge landowners the same property taxes for land no matter what it is used for.

    ___ Educate everyone about the value of natural habitats.

    ___ Give landowners a very low property tax rate if they donate their land as a State Natural Area or Preserve.

    ___ Assist landowners in preparing a conservation plan for their land so that if they want to develop part of it, they can save the best habitat areas for wildlife.

SPECIAL NOTE: The idea for Work Step 10 was taken from a letter received by the Illinois Department of Conservation from Roger Rhodes, a sixteen-year old student in Peoria. Roger's letter expressed concern about how one of his favorite places, a forest behind his house, had been replaced by buildings and roads.



Developments in Forest

Wooded Park Model

41

42

DAY 6 - Investigating Green Belt Habitats

MISSION

Complete a model of a Green Belt Habitat.

INSTRUCTIONS

1. Study carefully the Green Belt Model on page 41.
2. Follow the same instructions given for #2 of Day 4.

Work Steps

1. The model on page 41 shows a special kind of urban habitat known as a green belt. As you can see in the model, there is a road and a set of railroad tracks. Certainly, the road and railroad tracks are not habitat areas for wildlife. But the narrow strips of land alongside the road and railroad tracks are places that can support plants and animals. Those grassy strips of land are called green belts.

   Green belt habitats are found in every city and town. They border streets, highways, and railroad tracks. The corridors of land beneath transmission line towers are also green belts. Think about all of the green belts you have seen in the community where you live. On a separate sheet of paper, list the locations of all of the green belts you know of.

2. Green belts are important habitat areas for two reasons. First, they provide a home for plants and animals. Secondly, they serve as travel lanes for animals as they move from one habitat area to another. Let's look at an example of how animals travel along green belts.

   Look the model over carefully. Do you see an animal hiding in the grass? If so, use your Field Guide to identify it, and write its name here. _____ That animal is not just hiding in the green belt; it is traveling through it. Let's say that a few days ago, the rabbit in the model was living in a park that had so many rabbits there was not enough food for all of them. So, this rabbit set out to find a less-crowded park. To do that, it will travel along this green belt until it connects with another park.

Many other animals, in addition to the eastern cottontail rabbit, depend upon green belts as travel lanes. Without the green belts, all of the different habitat areas in an urban area would be like islands. The animals in each area would be trapped there. But, since the green belts connect the habitat areas, the animals can move freely from one area to another.

3. Although some green belts have trees, most are open areas stocked full of grasses, shrubs, and wildflowers. Using your Field Guide, try to pinpoint the plants shown in the green belt model. They are field thistle, gray dogwood, and big bluestem.
4. There are many animals that live in or travel along green belts. It is your job to place three of those animals in your model. In your Field Guide, find animals that match the descriptions below. Write the name of each animal on the blank line following its description. Then cut each animal out of your Mini-Guide and paste it into the model in the locations indicated.
   A. A short-tailed mammal that is brownish-gray above and yellow or rust below. _____ Place this animal in its tunnel in the lower left-hand corner of the model.
   B. A tan, long-tailed mammal that has 13 stripes. _____ Place this animal at the entrance to its underground burrow in the lower right-hand corner of the model.
   C. A small black-and-gold bird. _____ Place it in the gray dogwood shrub so that it can feed the young birds lined up on the dogwood branch.
5. Like all urban habitats, green belts are surrounded by the hustle and bustle of human activity. In your Guide to People in Urban Habitats, find four persons that match the descriptions below. Cut them out and paste them into the model in the locations you think they should be in. Be sure to place them in areas where they won't cover up any animals.
   A. A railroad conductor in a train.
   B. Two people riding in a car.
   C. A person riding a bike.
6. Look up and review the definition of the word "niche" in your Spy Training Manual. Now, let's compare the niches of some of the species that live in or travel along green belts. The niches of three different species you placed in the model are described below. Study each niche description carefully. Then, using what you can see in your model, decide which species each description is referring to, and write the name of the species on the blank line. Once you are done, you will know the special

place and role of those species in green belt habitats.

A. _____This species' special place is both above and below the ground. It travels through the grasses to gather seeds and insects. In an underground burrow, it hides, hibernates, and raises its young. Since this species eats a large number of insects, it helps keep the insect population under control.

B. _____ This species keeps its nest in the branches of a small tree or shrub. It feeds mostly on seeds, especially those of field thistle. As it picks apart flower heads for seeds, it helps scatter them about the habitat.

C. _____ This species travels along green belts by foot, bike, train, and car. This species also lives in houses that are bordered by green belts. Since this species is in charge of all of the land in Illinois, it cares for and maintains green belts.

7. In Work Step 5, you learned about the niches of thirteen-lined ground squirrels, American goldfinches, and human beings in green belts. On the blank lines below, describe what each of those species does to benefit green belt habitats.

A. Thirteen-lined ground squirrel: _____

_____

B. American goldfinch: _____

_____

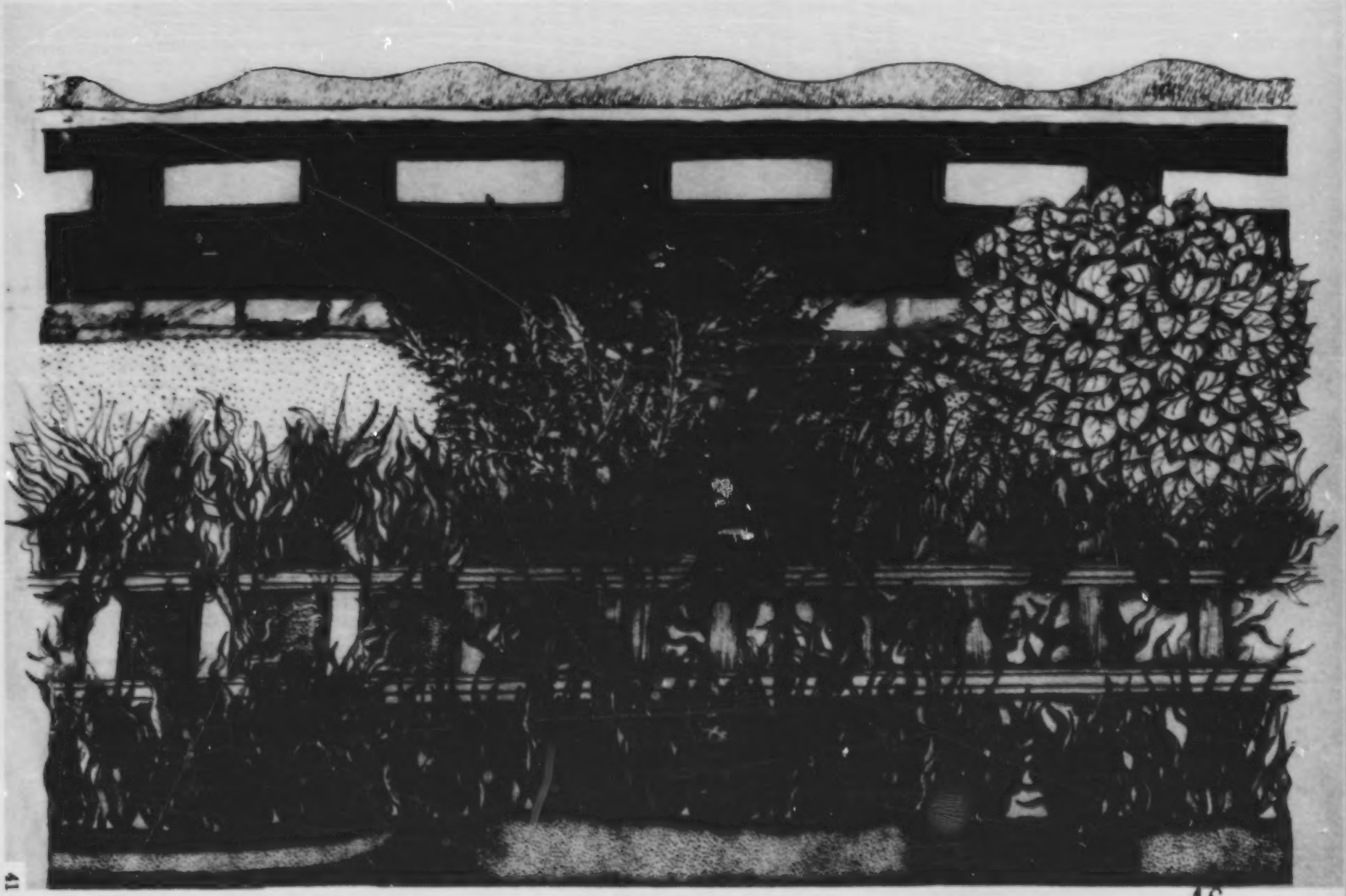
C. Human being: _____

_____

8. Green belt habitats are threatened by many problems. When people throw litter or dump garbage in green belts, the quality of the habitat for wildlife is damaged. Oftentimes, green belts are mowed, and animals lose the cover they need to hide and nest. When green belts are totally cleared of vegetation, plants and animals living in them are left homeless.

You learned in Work Steps 5 and 6 that people are responsible for caring for green belts. In the space left on this page, write a story about why green belt habitats are important, how they are threatened, and what we can do to care for and protect them.

Green Belt Model



DAY 7 - Investigating Backyard Habitats

MISSION

Build a model of a backyard habitat.

INSTRUCTIONS

1. Study carefully the backyard habitat model on page 43.
2. Follow instruction #2 for Day 4.

Work Steps

1. The model on page 43 shows the kind of urban habitat found in our very own yards. Since most people in Illinois have larger backyards than front yards, we'll call this habitat a backyard habitat.

   In the model, you can see an assortment of trees, shrubs, flowers, and grasses. All of these plants provide cover and food for animals. They are what can make any backyard a wildlife habitat. A yard with a bare lawn can support only insects and worms. Occasionally, an American robin might visit it to pluck out an earthworm. But a yard stocked with towering trees, thick shrubs, and nectar-packed flowers can be a healthy home for butterflys, toads, snakes, birds, and mammals. Just like a forest or a prairie, a backyard can be a wilderness brimming over with beautiful animals.

   Think about your yard and/or the yards you have seen in your neighborhood. On a separate sheet of paper, make two lists. For the first list, write down all of the yards that are just bare lawns. For the second list, write down all of the yards that could qualify as wildlife habitats. Be sure to also write down any animals you have seen in these yards.
2. Using your Field Guide, try to pinpoint some of the plants in the model. They include: white oak, blackberry, big bluestem, bluebells, and sugar maple.
3. Look the model over carfully. What is the name of the animal that is peeking out of its nest cavity? _____

   Using your Field Guide, find four animals that meet the descriptions below. Cut them out of your Mini-Guide and paste them onto the model in the locations indicated.

   A. A bird with a black bib and a large white rump. _____ Place this species on the bird bath.

   B. A buff to rusty-brown mammal that has a white powderpuff tail. _____ Place in the big bluestem grasses.

   C. A blue and grayish-white bird that has a blue crest and a black necklace. _____ Place on a limb of the white oak tree.

   D. A small brown bird with a tail that often points straight up. _____ Place in a limb of the sugar maple tree.

   E. A brownish-orange spider. _____ Place in the blackberry shrub.
4. As you can see in the model, there is a house right in the middle of the backyard habitat. There is also a person peeking out of the house. Probably more than in any other urban habitat, people, as well as plants and animals, are at home in backyard habitats.

   Using your Guide to People in Urban Habitats, find two people that fit the descriptions below. Then cut them out of the Guide and place them in the model so that they can go about whatever they are doing.

   A. A person barbecuing

   B. A person howing in a garden
5. Who do you think is responsible for caring for backyard habitats? _____ If you answered the people who live in the houses or apartment buildings that have yards, you are absolutely correct. Pretend you live in the house shown in the model. On a separate sheet of paper, explain how you would care for your backyard habitat. For instance, would you clear the plants or let them grow? Would you plant more plants? Would you keep the water fresh in the bird bath and put up bird houses and feeders? Would you let others throw litter or harm the animals in your backyard? Would you be careful to limit the amount and kinds of pesticides and herbicides you use in your yard? If you succeed in taking good care of your backyard habitat, will you and your family benefit along with the plants and animals? Explain your answer.

To qualify for Certification Card below, complete Chapter 6 on page 70.

This card officially certifies

_____

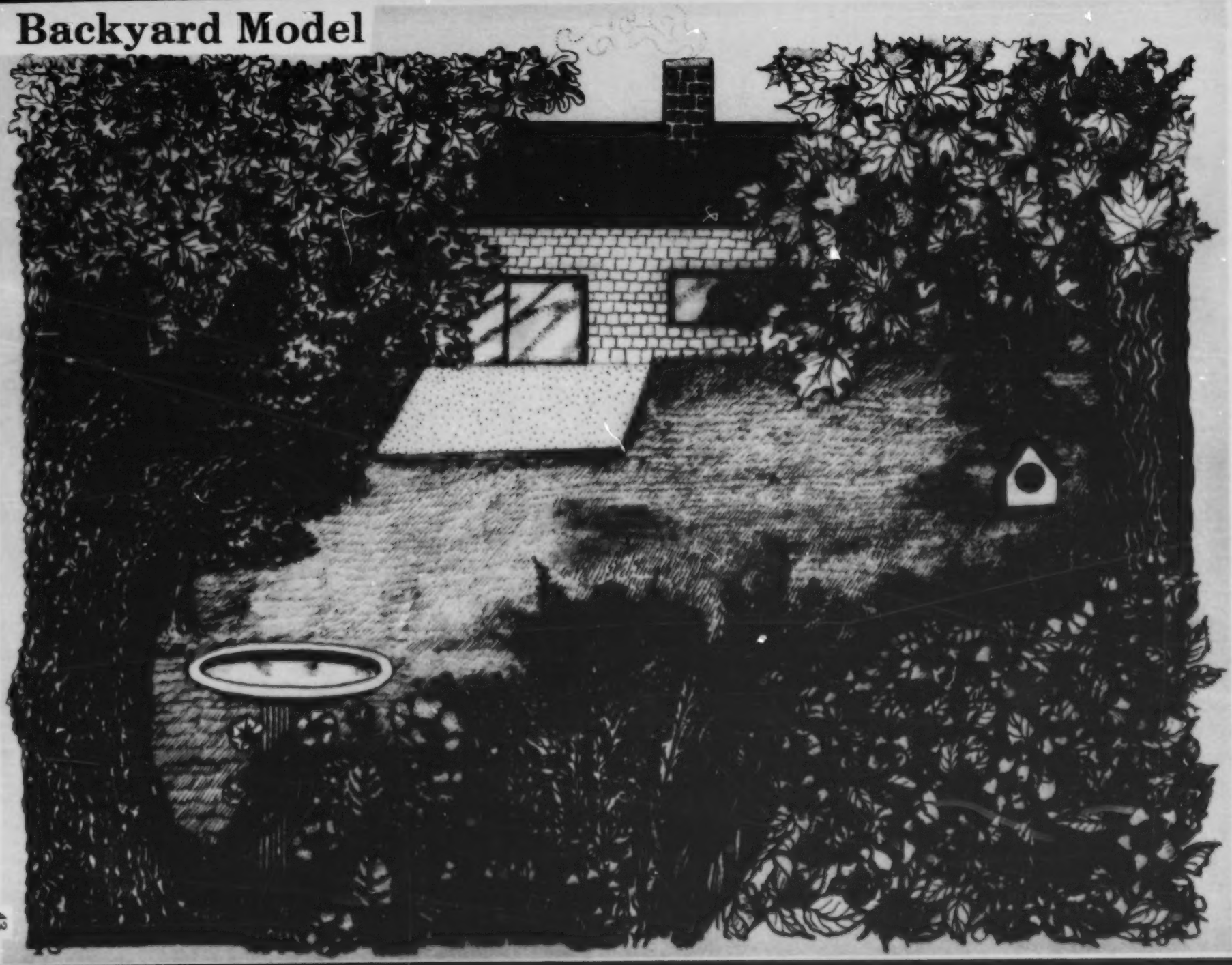
as an Illinois Urban Sleuth

Date: _____

Total number of Sleuthwork Points Earned: _____

Presented by the Illinois Department of Conservation

Backyard Model



DAY 8 - Designing Your Own Backyard Wildlife Habitat

MISSION

Design a backyard habitat for your yard.

INSTRUCTIONS

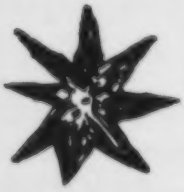
Complete Work Steps 1-6.

Work Steps

1. Study carefully the model of a backyard on page 46. Pretend the house in the model is yours, and write your name on the blank line.
2. At the present time, the backyard shown in the model is just a bare, tidily mowed lawn. It is your job to create a habitat in the backyard that can support wildlife. To do that, you will have to fill in the model with a variety of plants. Those plants will transform the barren world that is in the backyard now into a wild place where animals can hide, raise their young, and find food.

   As your first step, let's choose some symbols for the plants you might want to plant in your backyard. Listed below are symbols for four categories of plants. The categories are A. large trees; B. medium and small trees; C. shrubs, and D. wildflowers, vines, and grasses. Once you have reviewed the symbols, find in your Field Guide the names of plants that fit each category. Then write the names of the plants on the blank lines in each category. Those plants will be the ones you can use to create your backyard habitat.

Plant Categories



A. Large trees: _____
_____

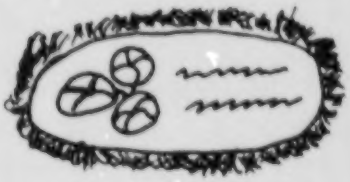
B. Medium and small trees: _____
_____

C. Shrubs: _____
_____

D. Wildflowers, vines, and grasses:
_____

3. Now that you have chosen plants that can provide animals with cover and food, it is time to think about the other important thing they will need to survive. Can you guess what it is? _____ If you said water, you are quite correct. The three things that wildlife need in a habitat are cover, food, and water. When you design your habitat model, you'll need to put in some sources of water. Shown below are symbols for two sources of water. One is a bird bath; the other is a small pond. Please label them on the blank lines.

_____



_____

4. Many species of wildlife can benefit from man-made sources of shelter and food. Bird feeders, for example, provide much needed food for many birds. During the winter, when insects are scarce and the ground is covered with snow, the food birds get at feeders can help save their lives. When summer rolls around, cavity-nesting birds like the house wren and bluebird can also make good use of bird houses. In these houses, their nests and young are protected from backyard cats and dogs. Label the symbols below for these two man-made sources of shelter and food.

_____

_____

5. Now that you have symbols for all of the things you will need to put in your backyard habitat, it is time to begin work. On the bottom half of page 46, you will find all of the symbols. It is your job to cut those symbols out, and place them in your model to create a backyard habitat. But it is important to do your work one step at a time. To do that, simply follow steps A-F listed below.

   Step A: Cut out the large tree symbols. The large trees are the ones that will form a wall of protection against weather and predators in your habitat. Also, many animals will find the shelter they need in their branches and cavities. For those reasons, place the large tree symbols in your model so that they will form a natural fence around the backyard. And, for extra protection, put two layers of large trees in the back corners of the yard.

   Step B: Cut out the medium and small tree symbols. These trees will be important perching, nesting, and feeding spots for many of the smaller animals. You should place them directly in front of the large trees so that their branches will interlock. That way, animals can move about all of the trees without having to leave the cover of their branches and leaves.

   Step C: Cut out the shrub symbols. Like the trees, the shrubs are important sources of shelter and food. Since they are low to the ground, they are often the first cover animals can get to if there is trouble. Then from the shrubs, they can move into the trees. So that your habitat can provide a continuous belt of cover for animals, place the shrubs in front of the small trees, expecially in areas where there is a gap between the trees.

   Step D: Cut out the wildflower, vine, and grasses symbols. These plants are important sources of food for butterflies, bees, and some birds. They are also quite lovely for people to look at. Since this is your yard, place the wildflowers, vines, and grasses in the areas where you think you might enjoy them.

   Step E: Cut out the two water symbols. Place these in the model close to the plants. This way, animals that go to drink will never be very far from a source of cover.

   Step F: Cut out the two man-made structure symbols. Like the water, place these in the model close to the protective cover of plants.

6. Your backyard habitat model should now be complete. You should have a model that has plenty of plants for wildlife and open space for people who want to picnic, play ball, or garden. Be sure to save your model. You can use it to actually create a real life backyard habitat. That is one of the most important things we can all do to create urban habitats for wildlife.

driveway

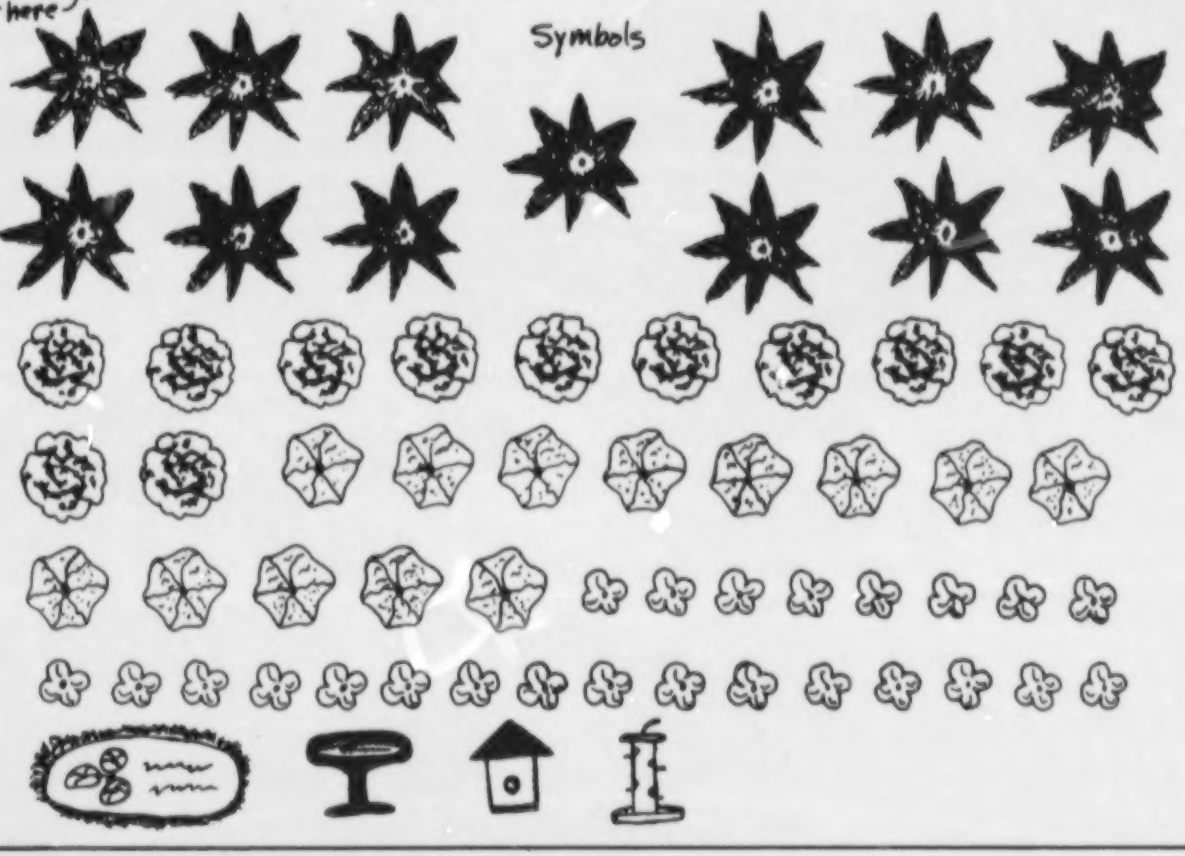
house of _____

porch

backyard model

cut here

Symbols



Chapter 4

Illinois Cave Habitats

Dear Student:
This chapter will take you deep into the world beneath us. Your mission will be to investigate caves and the wild creatures that live in them. At first, you may find caves to be mysterious, even spooky. But by the time you finish your work, we hope you'll think of caves as friendly places, full of wondrous animals and spectacular natural features. You can begin your exploration of caves by completing the assignment for Day 1.

DAY 1 - Understanding the Nature of Caves

MISSION

Learn what Illinois caves are like and how they are formed.

INSTRUCTIONS

Read the information below and complete Work Steps 1-3.

Caves are Illinois' most unusual natural habitat. Unlike a forest, a cave has no green plants. Unlike a prairie, there is no sunlight in a cave. Compared to a marsh, where birds are singing and frogs are croaking, a cave is a silent world. Caves do have water, just like above-ground streams, but cave fish are blind and colorless, quite a bit different from stream fish like the big-eyed chub and rainbow darter.

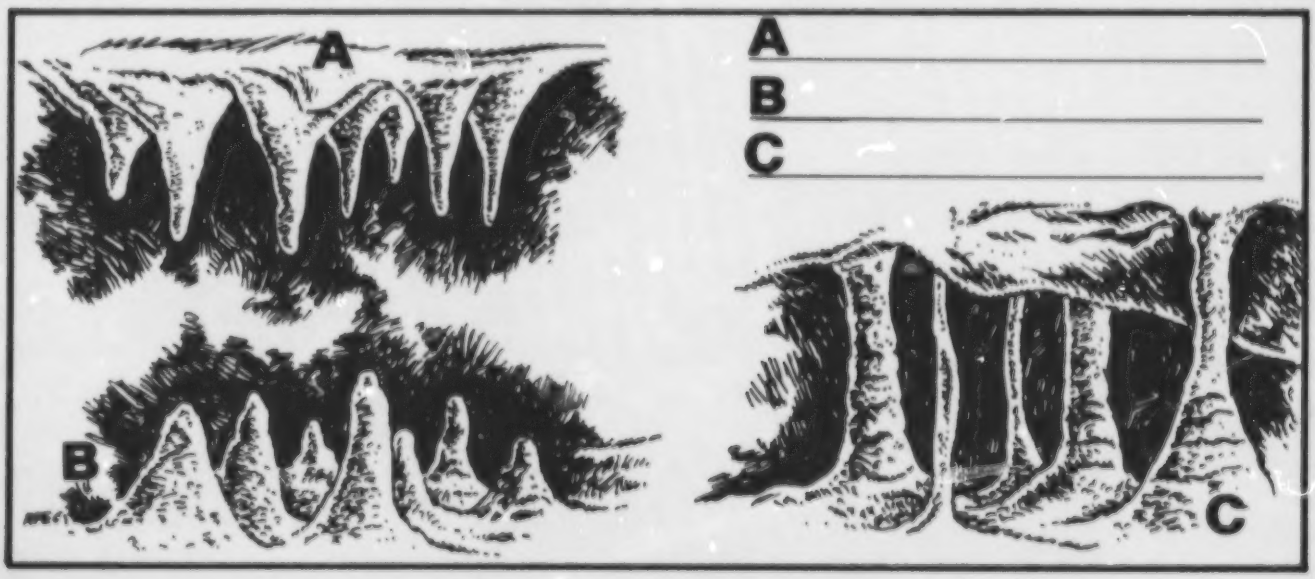
The caves we have in Illinois today took hundreds of thousands of years to form. The story of how they were created begins with simple rainwater. As you probably know, when rainwater hits the ground, the force of gravity pulls it down into the earth. During the water's downward journey, it cuts out large caves in the earth's crust. This is how it works.

After hitting the ground, the rainwater moves first through the same soil that we walk on. As it seeps down through the soil, it picks up acid from decaying leaves, roots, and branches. Then, laden with this acid, it continues to move downward until it reaches a hard layer of the earth's crust known as limestone.

The limestone is no match for the water. The acid in the water is very effective at dissolving the minerals in limestone. So, inch by inch, the water eats away at the limestone until it is riddled with thousands of tiny cracks. Then, as the centuries pass, the cracks widen until they become large tunnels. Eventually, the tunnels connect with other tunnels, and a gigantic chamber or cave is born.

During the first several hundred thousand years, or so, of a young cave's life, it is full of water. But, remember, water is always moving downward in search of the water table deep inside the earth. A cave reaches maturity when most of the water drains out of it, leaving it only with a central stream. Of course, until the cave collapses in its old age, there will always be water dripping down from its roof from the land above. It is this dripping water that forms the spectacular formations in caves known as stalagmites, stalactites, and columns.

(cont. on next page)



Each *stalactite* begins along the roof of the cave with a single drop of water. The drop of water, which is clinging to the roof, is laced with calcite that it has eaten out of the limestone. When the drop of water finally falls to the cave floor, it leaves behind a tiny deposit of the calcite on the roof. As a trillion billion, or more, drops of water do the same thing in the same spot, the calcite deposit grows into a glistening, icicle-shaped formation. The making of just one of these stalactites takes thousands of years.

The same drops of water that form stalactites build *stalagmites* as they hit the cave floor. A stalagmite is usually rounder or smoother than a stalactite, and of course, builds upward from the cave floor, rather than downward from the ceiling. If a stalagmite meets up and binds together with a stalactite, a *column* is formed.

Work Steps

1. Shown at the bottom of page 47 are three cave formations–stalactites, stalagmites, and columns. On the blank lines (A-C) beside the formations, label them.
2. On a separate sheet of paper, explain why cave habitats are different from above-ground habitats like forests, prairies, marshes, and streams.
3. Explain how caves are formed. How long does it take?

DAY 2 - Discovering Why Caves Are Important

MISSION

Find out why caves are valuable to wild animals and people.

INSTRUCTIONS

Read the information below and complete Work Steps 1-3.

You learned during Day 1 that caves are very different from the important natural habitats we live near and visit. Many of us have wooded habitats right in our backyards, but none of us live in caves. And, if we want to go fishing, hiking, or birdwatching, we certainly don't choose to go into caves. Forests, prairies, and wetlands are all better places for the activities we enjoy. However, that doesn't mean that caves are not an important part of our environment.

It's easy to understand why caves are valuable to wildlife. There are many animal species that are suited for life *only* in caves. Some of these animals, like the cave crayfish, spend all of their time in caves. Others, like the Indiana bat, depend upon caves as safe places to hibernate during the winter.

A cave is a perfect hibernation spot for bats because it is insulated on all sides by the earth. This insulation keeps the temperature in the cave steady and above freezing. Throughout the long, cold Illinois winter, *twelve* different bat species hang safe and warm along the walls of caves. Two of those species, the Indiana bat and the gray bat, are endangered. Without the refuge they find in Illinois caves, they would be one step closer to extinction.

Caves are valuable to people because we have so much in common with them. The water that flows through caves comes from the same supplies of water that we depend upon. The limestone that caves are formed in is the limestone that supports our cities and farms. The bats that hibernate in caves during the winter are the same bats that spend the summer helping to rid our forests, parks, and backyards of unwanted insects. A single bat can eat about 3,000 mosquitos in one night. If those pesty, little insects drive you crazy on summer nights, you might not even dare to go outside if bats were not on patrol.

What this all boils down to is that the cave world is an important part of our world. When it and its wild creatures are doing well, we are all better off. And when we are careful to preserve caves, we get the added bonus of being able to study their spectacular and ancient formations.

Work Steps

1. Explain why caves are important to wildlife.
2. Why are caves ideal hibernation spots for bats? What two Illinois bats are endangered species?
3. When caves and their wild creatures are preserved, people benefit. Can you explain why?

DAY 3 - Building A Cave Field Guide

MISSION

Create your own Field Guide to *nine* cave species.

INSTRUCTIONS

Listed below are descriptions of *nine* animal species. Read each description carefully. Then, using what you have learned, find the drawing of that species in the Field Guide on pages 49 and 50. Write the name of the species on the blank line beneath the drawing. There will be at least one clue beside the drawing to help you make the match. Species Descriptions (L = Length)

cave cricket: This humpbacked insect is yellowish-gray to dark brown. Its antennae are very long. (L ⅜-1″)

eastern phoebe: This bird is grayish-black above and light gray to white below. It has a dark head and a solid-black bill. Song: "fee-be." (L 5¾″)

gray bat: This endangered mammal has gray, velvety fur. (L 3½-4″)

eastern pipistrel: This bat has yellow brown to plain-brown fur. Its underside is lighter, and its wings are a dark reddish-brown. It is Illinois' smallest flying mammal. (L 2⅛-3⅜″)

barn spider: This dark-brown spider is covered with whitish hairs. Its legs are marked by yellow bands. (L ⅜-⅞″)

cave salamander: This slender amphibian is red to red-orange. It can be easily told by its black spots. (L 4⅞-7⅛″)

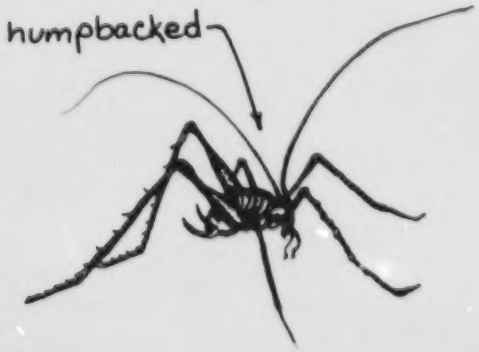
pickerel frog: This high-powered jumper has smooth, tan skin. There are parallel rows of dark, squarish blotches running down its back. Its belly and underside of legs are bright yellow to orange. (L 1¾-3″)

cave crayfish: Since this species has no color in its exoskeleton, it appears to be almost clear to white. It can be told by its long antennae, pincher claws, and slender legs. It is also blind. (L ¾″)

spring cavefish: This small fish is brown or flesh-colored. A light-colored stripe runs along its sides. Its tail fin is paddle-shaped. Since the cavefish's eyes are tiny and covered over with skin, it must feel its way about in the water with the aid of special vibration receptors. These receptors, located along its head and sides, pick up vibrations in the water, and this is how the fish guides itself in the dark. (L 3″)

Caves Field Guide

When cutting out animals, do not cross center line.



Caves Field Guide

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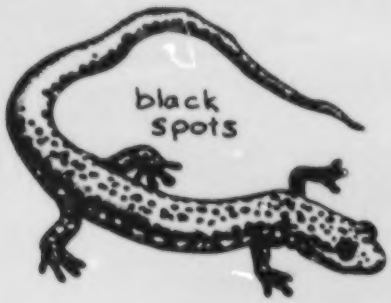
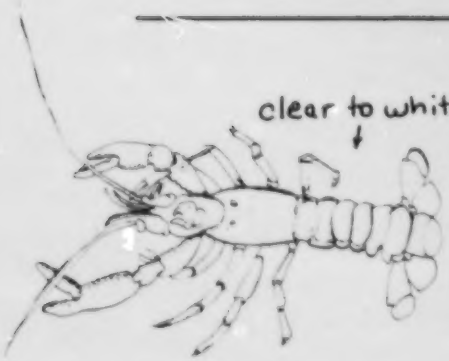
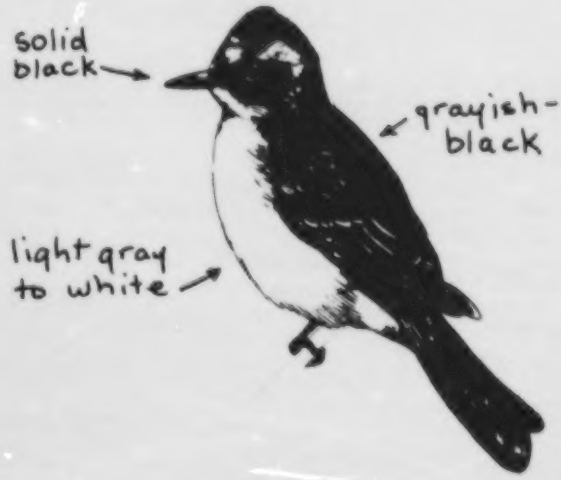
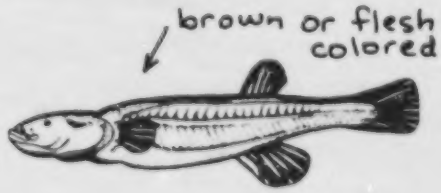








DAY 4 - Taking A Field Trip Through A Cave

MISSION

Explore a cave to learn its secrets and spy on its animals.

INSTRUCTIONS

1. To carry out your mission, you will need to become a "spelunker" or cave explorer, and you'll need some special equipment. Caves are dark and wet, so you'll have to wear sturdy clothing, rubber boots, and a hard hat. To help you see in the dark, you will need a flashlight, plus a headlamp that can be attached to your hard hat. Try this one on for size.

2. Caves can be very dangerous places. No one should explore a cave without an experienced guide. Fortunately, "Super Sleuth," the same person who accompanied you on the dunesland field trip, is available today to guide you through a cave. In the drawing below, "Super Sleuth" is the one on the left. Pretend you are the little spy or the right, and sign your own name on the blank line.
3. As you and Super Sleuth travel through the cave, you will see or hear nine different mystery species. Upon each encounter, look up the identity of the mystery species in your cave field guide. Once you have identified the species, cut the drawing of it out of your field guide and paste it onto the empty box shown in the field trip. Be sure to write the name of the species on the blank line at the top of the box.
4. During your exploration, Super Sleuth may ask you questions. You will have to figure out an answer and write it on the blank lines provided.
5. Even though your trip through the cave will actually take only one afternoon, there is much to see and learn. For that reason, your paper work has been divided into four parts, and you can take as much time as your teacher says to complete each part. Your mission in each part will be to explore one of the cave's four zones. Before you leave each zone, be sure to take a few minutes to answer the exploration questions on a separate sheet of paper. Your answers will serve as the log of your field trip.
6. You can begin your trip by stepping into the entrance zone of the cave.

Part 1 - The Entrance Zone

It is a hot and sticky summer afternoon in southern Illinois. The outside temperature is 100° and the mosquitos are thick. You and Super Sleuth have been hiking through a forest and are just now stepping into the entrance of a cave. From behind you, rays of sunlight are streaking into the

(cont. on next page)

cave. Above and beside you, the walls of the cave are cool, moist, and covered with moss. A small stream is trickling by at your feet.

"Whew," sighs Super Sleuth. "It's a bit cooler in here, probably about 90°. Let's check the water temperature."

You stick a thermometer in the water and get a reading of 58°.

"This is the only zone in the cave that gets a good supply of sunlight from outside," says Super Sleuth. "Green plants must have sunlight to conduct photosynthesis and grow, and there's just enough light here to support a few of them. You can see the moss on the walls, and look here at these stones in the stream."

You bend down and examine the stones Super Sleuth is picking up. The tops of the stones are covered with green algae, but the bottoms are bare.

"Here's your first cave exploration question," says Super Sleuth. "Why are green plants growing on the tops of these stones but not on the bottoms?"

You think for a moment and answer, "_____ _____."

"Good answer," replies Super Sleuth. "The tops of the stones are exposed to sunlight, the bottoms are not. When we move farther into the cave, there will be no sunlight and no green plants. The only plants we will see will be the kind that can grow in the dark–bacteria and fungi."

"But, Super Sleuth, if there are no green plants in a cave, how do cave animals get plant food?"

"That is an excellent question, but I think it's one you can solve yourself. Why don't you start by taking a close look at the water in this stream?"

You kneel down by the stream and shine your flashlight into the water. What you see is pile after pile of floating debris. It looks like this.

"How many different items can you see in the debris?" asks Super Sleuth.

You look the debris over carefully and answer, "_____ _____ _____."

Super Sleuth looks at your answer and nods. "All of the things you just listed," she says, "the leaves, berries, twigs, beetles, roots, and worms, are part of the world outside of this cave. How do you think they got in here?"

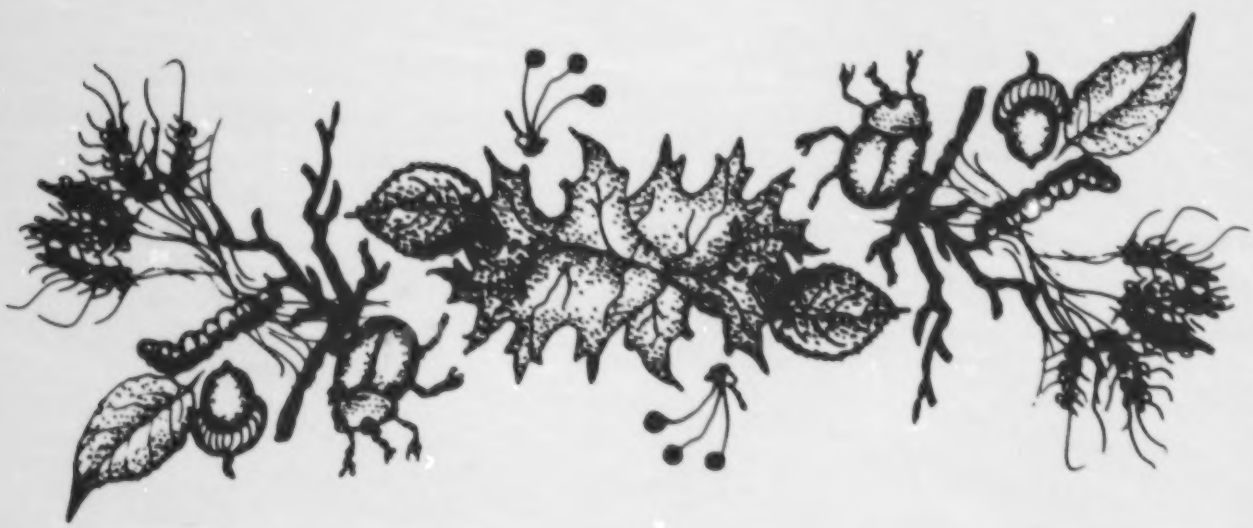
You think about how this stream flows out into the forest and you answer, "_____ _____ _____ _____."

"You are quite right," smiles Super Sleuth. "All of this debris was carried into the cave from the forest outside. During the spring and summer, when the rainfall is really heavy, this stream floods and fills the cave with loads of plant material, worms, and insects."

"Knowing all of this," continues Super Sleuth, "can you answer your own question now about how cave animals get plant food?"

You think for a moment and answer, "_____ _____ _____ _____."

"Good answer. Now you know that the cave animals get most of their plant food from the debris brought in by this stream. There were also some beetles and worms in the debris. Those creatures will serve as food for the cave animals that also eat meat. You see, there isn't much food here in the cave, not like there is in a forest, where there are plenty of trees, flowers, and berries. So, the cave animals have to depend upon food that is brought in from the outside world."



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"Do they get all of their food from the stream?" you ask.

"No," answers Super Sleuth. "The stream certainly provides them with a large portion of their food, but animals also bring in food from the outside."

"Which animals do that?" you ask.

"Well, I'll tell you, little spy. That's another question I think you can answer yourself. So, as we continue to explore this cave, be on the lookout for clues."

"OK, I will, but listen for a second. I hear something."

Super Sleuth listens and hears it, too. Birds are chirping.

You pinpoint the sound to the cave wall close to the entrance. Then, you see a mystery species.

A grayish-black bird is standing on the edge of a small nest. The nest, woven of moss and mud, is plastered onto the cave wall. You can see the open, chirping mouths of two young birds in the nest. The adult bird places an insect in each of their mouths and flies out of the cave. The bird is mystery species #1. Find it in your Field Guide and paste it in the box below.

Mystery Species #1 _____

While you are identifying species #1, Super Sleuth has been investigating the other wall of the cave. Now, she is calling you over to it.

"Look at this," she says sadly. "Somebody has come in here and painted their name on the wall. See how the paint has killed the moss? The eastern phoebe won't be able to use this moss for its nest."

You look at the paint and run your hand over the moss. Instead of green and moist, the moss is sticky and brown. As you are feeling the moss, your fingers run up against something that makes you jump.

"Whooaa, hold on there, little spy", chuckles Super Sleuth, "that's just a spider's web. Look, I'll show you. See how there is a line running up the cave wall from the web? If we follow that line, I bet we'll find a spider waiting. You see, this kind of spider doesn't sit in its web during the day. Instead, it spins a line away from its web and hides. When an insect gets caught in the web, the line shakes and the spider knows to come and collect its prey. The line is just like a fishing pole for the spider."

"That's pretty neat, Super Sleuth, and I think I do see the spider. It's up there on the cave wall. It's brown, and it has yellow stripes on its legs. It must be mystery species #2."

Mystery Species #2 _____

When you finish up with species #2, Super Sleuth says it is time to move into the cave's next zone. But, before you leave, be sure to answer these exploration questions.

Exploration Questions

1. What was the temperature outside of the cave? What was the air and water temperature in the entrance zone of the cave? Describe the light condition in the cave.

(cont. on next page)

2. Many cave animals that live in the water, including crayfish, lay their eggs so that they will hatch during the mid-summer floods. From what you discovered about how cave animals get food, do you think mid-summer is a good hatching time for thousands of hungry young creatures? If so, explain why.
3. During your exploration of this zone, did you and your guide encounter a problem caused by people? If so, what was it? How could it be prevented?

Part 2 - The Twilight Zone

You and Super Sleuth have walked about twenty feet further into the cave. The light is dim now, and the temperature has dropped. The air temperature is 70° and the water temperature is 56°.

"Welcome to the twilight zone," announces Super Sleuth. "But don't worry, it's not a bit like the twilight zone on T.V. It's called that because it is the last part of the cave that has any light at all from outside, just like the twilight time before darkness sets in at night."

"Is there enough light here for green plants?"

"Just barely, I can see that there is still some algae on the stones in the stream. But we won't see any other green plants in the twilight zone. Let's look for some animals instead. We'll start with the stream."

You bend down over the stream and Super Sleuth criss-crosses the water with her flashlight.

"Hold it," you whisper. "I see something."

"Can you describe it?" asks Super Sleuth.

"I can try, but it's hiding beneath some leaves in the water. All I can really see is its tail. No, it's not really a tail. It's a fin, and it's shaped like the rounded end of a paddle. I think this must be mystery species #3."

Mystery Species #3 _____

After you have pasted in species #3, you notice that Super Sleuth is picking something out of the water. A big frown is on her face.

"What's wrong?" you ask.

"I'll show you," says Super Sleuth. "Do you recognize what I've got here in my hand?"

You look in Super Sleuth's hand and answer, "_____."

(cont. on next page)

"Unfortunately, you're right," sighs Super Sleuth. "This is one very dead spring cavefish."

"How did it die?" you ask.

"Water pollution, most likely," says Super Sleuth.

"Water pollution! How could the water in this cave be polluted? It's so far away from factories and cars."

"Not quite as far as you think. The water in this stream and the water dripping from the cave's ceiling is coming from the outside world. And it's water that is loaded with pollutants. It is carrying pesticides from our fields and toxic chemicals from our automobiles, power plants, and factories."

"But, Super Sleuth, if the water is so polluted that it is killing the fish, does that mean it could kill us?"

"Most certainly, if the problem becomes bad enough. That's why we all need to work to keep our water clean. The dead fish is a warning to us. But, come on, let's continue our trip."

You turn and follow Super Sleuth as she walks farther into the cave. Then, all of a sudden, she stops dead in her tracks and you bump right into her.

"Quiet," she cautions. "I see something moving along that wall over there. You stand still. I'll flash my light at it. Then, look real quick. It will probably disappear in a flash."

"O.K. I'm ready. Do it."

Super Sleuth flashes the light on the wall. You see a slender, red creature scrambling up the wall. As it disappears into a crevice, you see it has black spots. It is mystery species #4.

Mystery Species #4 _____

"Good work," says Super Sleuth, after you finish identifying species #4. "That salamander is just about the quickest climber around. Plus, it's usually active at night. We were lucky to get a glimpse of it. Come on, let's move further into the cave."

You once again turn and start to follow your guide, but you have taken only two steps when you hear a loud splash. You and Super Sleuth spin around.

Super Sleuth floods the water with light, and you creep closer to get a good look. What you see is a slick, little animal doing the frog kick through the water. It is tan and covered with dark blotches. It is mystery species #5.

Mystery Species #5 _____

As you are finishing up with the identification of species #5, you see that Super Sleuth is turning on her headlamp.

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"You better turn yours on, too," she says. "As soon as you answer the Exploration Questions for this zone, we'll be heading for parts of the cave where the sun never shines."

Exploration Questions

1. What was the air and water temperature in the twilight zone? Describe the light available in the zone.
2. Which species did you identify as species #3? How does this fish navigate and catch prey in the dark water? Use your field guide to help you with your answer.
3. What problem did you discover in the stream of the twilight zone? What causes that problem? Why is the dead spring cavefish a warning to us, and what should we do to heed that warning?

Part 3 - The Variable Temperature Zone

As you and Super Sleuth walk away from the twilight zone, the cave world becomes darker and cooler. Soon, the only light is shining from your headlamps.

"Let's stop here. We are in the variable temperature zone now."

"Why is it called the variable temperature zone?"

"Oh, that's easy to explain. This zone is still fairly close to the entrance. When the weather changes outside in the forest, the air temperature in this zone also changes. The air temperature in here right now is 63°, but if it was cooler outside, the air in here would also be cooler. This is called the variable temperature zone because the cave air temperature *varies* with the temperature outside. In the deepest parts of the cave, the air temperature stays the same, no matter what the temperature is outside."

"What about the water temperature in this zone– does it change?"

"No. The water is sheltered by the earth, so its temperature stays constant. The water is 56° in this zone, the same temperature it was in the twilight zone. And it will stay 56° no matter how deep we go into the cave."

"How is this zone different from the twilight zone?"

"Remember how there was some light there. In this zone, there is absolutely no light."

"What kind of animals can live here in total darkness?"

"Let's find out. The cave wall is a good place to start."

You and Super Sleuth walk over to the wall. As your lights flash against the limestone, a bunch of hump-backed insects start jumping in all directions. They are mystery species #6.

Mystery Species #6_____

As you are pasting in species #6, Super Sleuth is looking over your shoulder. Now she is pointing at the drawing of species #6 and asking you a question.

"What do you make of this cricket?" she asks. "I mean, see how its eyes are so tiny? They really can't see much of anything. And check out the antennae on this cricket. They are four to five times longer than those on the field crickets that live outside in the forest. They are a lot more sensitive to the touch than the field crickets, too. Why do you think the cave cricket has puny, little eyes but such high-powered antennae?"

You look around at the dark world of the cave cricket and answer, "_____

_____."

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"Good answer, little spy. You just explained how animals can live in an environment where there is no light. They have little use for strong eyes to see with. But they need super-sensitive equipment on their bodies to help them feel their way about in the darkness."

"But, Super Sleuth, it's so dark in here. I don't understand why cave animals need eyes at all."

"That's a good point. If the cave cricket stayed in the cave all of the time, it wouldn't need eyes. But, since it leaves the cave at night to look for food, it must have eyes to see in the moonlight. There are some animals, though, that never leave the cave. Let's try to find some of them. I think you'll be very surprised when you see what kind of eyes they have. Let's look in the water first."

You and Super Sleuth kneel down by the stream and flood the water with your lights. The water is full of brown, rotting debris. You start to reach down and move a bit of it when you pull your hand back. A creature that looks like a tiny, white ghost is creeping along the bottom of the stream. It is about 3" long, and it has long, dangling antennae and a set of pincher claws. It is mystery species #7.

Mystery Species #7 _____

While you are identifying species #7, you notice that it doesn't seem to know you and your guide are there. It isn't swimming away or trying to dodge beneath the debris. You point this out to Super Sleuth.

"You're right," she says, "that crayfish doesn't have the faintest idea that we are here. Remember how the cave cricket had small eyes? Well, this species has no eyes. It is totally blind. If you poked your finger into the water, though, the crayfish's antennae would pick up the vibrations and it would be long gone."

"Is that how the crayfish hunts down other animals--by sensing their movements in the water?"

"Yes, it is, and I'll show you some of the animals it eats. Look over here in the water. See those white flecks wiggling along the bottom? Those are flatworms. And can you make out the tiny, shrimp- like animals swarming over those leaves? They are called isopods and amphipods."

"Are those creatures blind like the cave crayfish?"

"Yes, and like all blind cave animals, they are also colorless. Now let's continue our exploring. There are some very important cave creatures that do have eyes, really good ones, that I want you to spy on."

You nod and start to follow Super Sleuth farther into the cave. As you round a bend in the passage, she grabs your arm.

"Hold it right here. The animals we are looking for are all around us."

"I don't see them."

"Shine your light over on that wall."

You do as your guide says, and this is what you see--a hundred or more solid-gray animals hanging upside down.

"Those are bats, aren't they, Super Sleuth?"

"Yes, they are. In fact, those are female bats. They are hanging together in what is called a maternity colony. Each one probably has a couple of young bats beneath her wings."

"What kind of bats are they?"

"You tell me, they're mystery species #8."

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Mystery Species #8_____

After you have pasted in the drawing of species #8, you ask your guide if you can walk up closer to the bats to get a better look.

"No, we shouldn't do that. We might disturb them. They need to rest because, as soon as night falls, they will leave their babies behind and go out into the forest to hunt for insects. They are incredibly efficient hunters, too. And that's terrific news for outdoor people like you and me. If we leave this cave after they do, there will be a whole lot less mosquitos out in the forest to bite us."

"That sounds like a good deal. Let's go back out into the forest only after they've had a chance to do their stuff."

"OK, we'll do that. But right now, I want to show you something."

"What is it?"

"Well, when the bats return from hunting each night, they digest what they've eaten and dump the waste product on the cave floor. It's called guano."

"Have we seen any of this guano yet?"

"You obviously haven't; you're standing in it."

"What!!" you shout, and look down at your boots. Sure enough, they are firmly planted in a thick, oozing pile of brown guano. And, for the first time, you detect a less-than-pleasant aroma in the air.

"Yuck! This is awful stuff."

"Hah," laughs Super Sleuth. "It may look and smell awful, but it's a very important source of food for many cave animals, including the crickets, flatworms, amphipods, and isopods that we just saw."

"Now," continued Super Sleuth, "can you answer your own question about which animals bring food into the caves?"

You think for a moment and answer, "_____ _____."

Super Sleuth smiles at your answer. "Good," she says. "Now you know that bats are very important to the well being of the cave community. They don't take away from the cave's small food supply--they hunt down all of their prey outside, but they bring in a tremendous amount of food for other cave inhabitants. They give a lot to the cave and, in return, only ask for a safe place to hibernate during the winter and raise their young during the summer. Which reminds me, I want to show you something that makes me very sad. I noticed it when you were looking at the guano on your boots."

"What is it, Super Sleuth?"

"Over here on the cave floor. Just look at all of these dead gray bats."

"What could have happened to them?"

"I don't know for certain. They could have died from eating insects that were coated with insecticides. Or, they could have been killed directly by people who came into this cave."

"Who would do that?"

"Unfortunately, little spy, there are people, probably a lot of people, that misunderstand bats. They think they are dirty and that they all carry rabies."

"Is that true?"

"Most certainly not. Bats are squeaky clean. Very few of them carry rabies. During the last thirty years, only eleven suspected cases of humans getting rabies from bats have been reported. And those people were bitten by a bat only after they were foolish enough to try to grab one. Think about it. If a creature that weighed 8,000 times your own weight, grabbed you, wouldn't you fight back?"

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"Why, yes, of course. I'd be scared to death. But, Super Sleuth, what about vampire bats, don't they suck blood?"

"Yes, that is how they attack their natural prey, but not people. And, besides, vampire bats don't live anywhere near Illinois. They live thousands of miles away in South America."

"I'm glad you've told me the truth about bats."

"That's good, and now that you know, you can tell anyone who thinks bats are bad creatures. If we all spread the word, maybe people will stop hurting bats."

"You've got a deal, Super Sleuth. Will we see any bats in the last zone of the cave?"

"Let's go find out. But first, you better answer the Exploration Questions for this zone."

Exploration Questions

1. What was the air and water temperatures in the variable temperature zone? Describe the light conditions.
2. In the variable temperature zone, does the air temperature vary with the temperature changes outside of the cave? _____ Does the water temperature vary? _____
3. Which species did you identify as species #7? What three animals did you see that species #7 feeds on?
4. Most of Illinois' bat species hibernate in caves during the winter but live outside, in wooded and urban areas, during the summer months. The bat you saw in this zone is one that does raise its young in caves during the summer. What was its name? Is it endangered? Did you and Super Sleuth find evidence of things that harm this and other bats? If so, what was it? What two things did Super Sleuth suspect as the cause of the harm? How can these kinds of problems be prevented?
5. Explain why bats are important to the well being of the cave community.
6. Super Sleuth told you that bats are often misunderstood by people. What is the truth about bats? Are they dirty? Do a lot of them carry rabies? Do they set out to attack people? Explain your answers fully.

Part 4 - The Constant Temperature Zone

You and Super Sleuth have now walked a couple hundred feet further into the cave. It is still pitch dark, but you can hear water dripping from the ceiling.

"Let's stop here," says Super Sleuth. "You look around for a second. I want to measure the air and water temperature."

You scan the walls of the cave with your light and see a few spiders and millipedes. All of them are solid white. You check out the water and see more white creatures. They look like beetles.

"Gosh," you remark to Super Sleuth, "I see some insects here, but they are all white, like the cave crayfish. Does that mean they are also blind?"

"Yes, quite blind. You see, we are in the constant temperature zone now. That means that we are so far away from the entrance, the air temperature is not affected by the temperature outside of the cave. The air and water temperature in here right now are both a constant 56°. Most of the species that live in this zone are blind. It's an ideal environment for blind creatures because they need a constant temperature to survive."

"But, Super Sleuth, we saw the blind cave crayfish in the variable temperature zone."

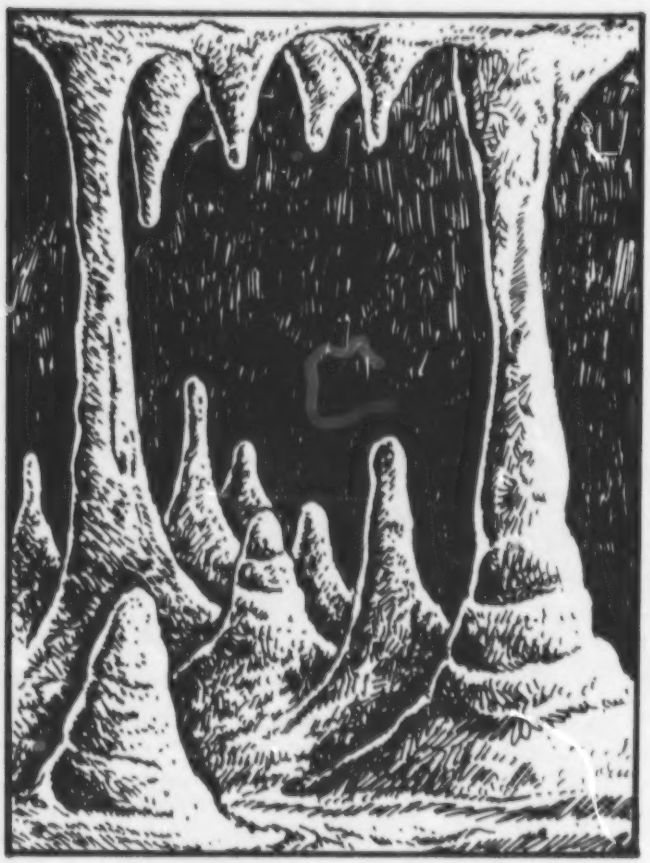
"You're right. We did, but if you recall, the water temperature in that zone was constant. It was only the air temperature that varied with the temperature outside. That is why we saw blind creatures only in the water. The animals we saw outside of the water had eyes. The cave cricket was one of them."

"Have we reached the end of the cave now?" you ask.

"Oh, no," replies Super Sleuth. "Follow me, I want to show you an enchanted world."

You start walking behind your guide. But, before long, the passageway along the stream narrows into a very small opening. Super Sleuth says you can follow the passageway no longer, and she turns and starts up another passageway. This new path is bedded with sticky, slimy mud. To keep from falling, you hold onto the tail of Super Sleuth's shirt. You climb up this tunnel for ten or fifteen minutes. Then, you notice that the passageway has widened into a large chamber. Super Sleuth stops and tells you to take a good look around.

What you see is the enchanted world Super Sleuth had promised. It looks like this.



"Those formations are spectacular!" you say to your guide.

"I think so, too," replies Super Sleuth. "We are looking at three different kinds of cave formations. Can you tell me what they are called?"

You check your work for Day 1 and answer "_____."

And when you are done, Super Sleuth calls you over to a group of stalagmites.

"This is a tragedy," she says. "See how someone has knocked the tops off of these stalagmites. It saddens me to think someone would destroy these wonders of nature. After all, they took hundreds of thousands of years to form."

"Me, too."

"Oh, well," sighs Super Sleuth. "At least, you and the other students in your class are learning about how special and important caves are. As we all learn more about caves, I think we will treat them better."

"You know, Super Sleuth, we've been here a long time. Should we be going?"

"In just a second. I have a treat for you. I see another bat."

"Where?"

"Over there. Shoot your light onto that wall."

You do just that and see a very small bat. Its fur is yellow brown to plain brown. The whole bat is covered with beads of water that are glistening like sequins in the light. It is mystery species #9.

Mystery Species #9 _____

After you paste in species #9, you hear a faint noise coming toward you in the darkness. SWIISSH!! Before you can duck, a dark object darts over your head.

"What was that?" you ask.

"It was just a bat going out to hunt. There's no need to be frightened; it wouldn't have crashed into you. Bats have one of the best radar systems in the world. They always know exactly where they are going, even in total darkness."

"How do they do that?"

"It's really quite simple. As a bat flies, it squeaks out short bursts of ultrasonic sound. Each squeak lasts less than 1/1000th of a second, and a bat may sound out 200-300 squeaks in just one minute. As the squeaks filter out into the air, they bounce off of objects, and the bats hear the echoes they make. Listening to those echoes, a bat can navigate through the tightest corner with near total accuracy."

"So it's not true that bats will fly into your hair if you are outside at night."

"No, it's not true. Bats have a lot of hunting to do at night. They have better things to do than harass people. In fact, bats use their radar power to steer clear of people."

"You know what, Super Sleuth? I wish I had a radar system, so I could fly like a bat."

"Ah, but little spy, you do; we all do. The radar system used in the planes that we fly in were developed by scientists who studied bats. Our equipment is not quite as sophisticated as the equipment on bats yet, though. That is one of the reasons why we should all try to conserve bats. We have much to learn from them."

"I've certainly learned a lot today."

"I have too, but we should start home now. Go ahead and answer the Exploration Questions, and we'll be on our way."

Exploration Questions

1. What were the air and water temperatures in the constant temperature zone? Describe the light conditions.
2. In the constant temperature zone, both the air and water temperature are constant and do not vary as the temperature outside of the cave changes. The water temperature stays constant because it is sheltered by the earth. Why does the air temperature stay constant? Do blind animals need this kind of environment to survive?
3. You and Super Sleuth discovered some cave formations in this zone. What negative thing had happened to some of the stalagmites? How could this sort of destructive action be prevented?
4. Judging from the appearance of species #9, do you think the humidity in the deepest parts of caves is high or low?
5. Explain fully how bats navigate in the darkness.

Chapter 5

Cliff and Bluff Habitats In Illinois

Dear Student:
The special habitat featured in this chapter isn't hard to find in Illinois. Just walk along any river, look to your left or right, and you'll see it somewhere nearby.

It may be a steep, rocky cliff towering near the river, or it may be a gently sloping bluff many miles away. But in either case, it is the habitat you will be exploring over the next three days. You can begin with your assignment for Day 1.

DAY 1 - Discovering the Natural Heritage of Cliffs and Bluffs

MISSION

Find out how cliffs and bluffs were formed, what they are like, and why they are important natural habitats.

INSTRUCTIONS

1. Study the illustration on the right of a cliff.
2. Read the information and complete Work Steps 1-4.

Many thousands of years ago the glaciers that covered most of Illinois melted and released an enormous amount of water. As this water rushed down the state toward the ocean, it carved out hugh river valleys. The Mississippi River Valley was one of them, the Illinois River Valley was another.

As century after century passed, the amount of water flowing through Illinois gradually decreased. Great rivers like the Mississippi and Illinois could no longer fill their valleys from brim to brim with water. So, very slowly, the rivers shrank in size, leaving the steep walls of their valleys high and dry. Those old river valley walls are what we now call cliffs and bluffs.

Throughout Illinois, wherever there is a river or stream, cliffs and bluffs are found. A cliff like the one shown in the illustration, is a steep wall of rock, either sandstone, limestone or dolomite. Along the rough and dry face of a cliff, only a few plants are able to establish a foothold. A bluff, on the other hand, is bedded with a thick blanket of soil. In this soil, many types of plants thrive. Some of our Illinois bluffs are covered with prairie grasses and flowers while others are stocked with trees and shrubs.

For many plants and animals, cliffs and bluffs are essential to their survival. Endangered species that depend upon cliffs and bluffs as their natural habitats include plants like bird's eye primrose, jeweled shooting star, and animals like the eastern woodrat and peregrine falcon.

People get a chance to enjoy many of Illinois' most majestic cliffs and bluffs when they visit the Shawnee National Forest and the state parks at Apple River Canyon, Mississippi Palisades, and

Starved Rock. To protect these cliffs and bluffs, as well as all of the others in Illinois, we need to work hard to prevent forest fires and littering. We also need to limit recreational activities such as rappeling and ORV driving along cliffs and bluffs. Like all natural habitats, cliffs and bluffs are an important but extremely delicate part of our environment.

Work Steps

1. Explain how the bluffs and cliffs in Illinois were formed.
2. Where in Illinois are these special habitats located? What are the differences between a cliff and a bluff?
3. Do many plants and animals depend upon cliffs and bluffs as their homes? If so, name four of the endangered species that do.
4. Are cliffs and bluffs important? What can we do to protect them?

DAY 2 - Building a Cliff and Bluff Field Guide

MISSION

Create a field guide to 19 plant and animal species.

INSTRUCTIONS

On pages 64-65, the descriptions of 19 plant and animal species are given. To carry out your mission, you will need to work with those descriptions in two steps. The steps are explained below, and please, be sure to work with one species at a time.

Step 1: As you read a particular species description, you will notice that the last line reads "Role 1. 2. 3. 4. 5. 6. 7." That line refers to the role that species performs in a cliff or bluff ecosystem. You learned when you prepared your Spy Manual that each species has its own niche in the ecosystem where it lives. That means each species has its own special place to live, whether it is a nest on a rocky ledge or a den in a hollow log. It also means that each species has its own *special role* to play in the habitat. For example, a plant species' role might be to produce plant food for animals. An insect species role might be to help pollinate plants.

Shown below is a species *Role Chart*. On the left, seven of the most important roles of individual species are described. On the right, the kinds of species that play these roles are explained. Study the *Role Chart* carefully, and you will be prepared to finish Step 1.

Based upon what you have read in each description about how a particular species lives, especially what it eats and what eats it, decide which of the roles in the *Role Chart* it performs. Then, on the last line of the description, circle the number of each of the roles you've decided that species performs. Here is one clue to help you work. Many of the species perform a combination of roles. For example, a tree may perform roles 1 and 2.

Once you have completed Step 1, you will be able to see how each species contributes to the well being of the entire natural community along cliffs and bluffs. That is why each and every species, no matter its size or beauty, is valuable and irreplaceable.

Step 2: Each of the species descriptions also includes an explanation of what that species looks like. Using that information, find the drawing of each species in the field guide on pages 66 and 67. Then, write the name of the species on the blank line beneath or beside its drawing. There will be at least one clue beside the drawing to help you make the match. Once you have labeled all of the drawings, your Field Guide will be complete.

Role Chart

No.	Role	Species that Perform that Role
1.	Produce Plant Food	All *plant* species that are eaten by animals.
2.	Provide Shelter	All *plant* species that animals nest and/or hide in.
3.	Pollinate Plants	*Insect* species that visit flowers in search of pollen and/or nectar.
4.	Spread Plant Seeds	Any *animal* that eats the seed-packed fruits of plants; the seeds are spread when animals pick the fruits apart or when they pass the seeds out in their feces.
5.	Serve as Animal Food	Any *animal* species that is eaten by other animals.
6.	Control Animal Populations	Any *animal* that preys on other animals helps control the overall population of animals in an ecosystem. There is only so much space and food available in an ecosystem. A population explosion of animals would cause a severe shortage of space and food and animals would die needlessly.
7.	Recycle Dead Material	Any *species* that feeds on dead animals or plants, thereby helping to tear them down into smaller pieces. The pieces decay and break down into important nutrient elements. Those nutrients enter the soil and are tapped by plants that need them to grow.

PLANT DESCRIPTIONS: (H = Height)

post oak: This small to medium-sized tree has gray or light-brown bark. Its dark-green leaves have fine lobes. A pale-brown acorn, about 1" long, is its fruit. (H up to 60') Small birds hide and nest in the branches of post oaks. Its acorns are a favorite food of squirrels. *Role*: 1. 2. 3. 4. 5. 6. 7.

eastern red cedar: This medium-sized tree has reddish-brown bark that splits into long shreds. Its leaves are green and needle-like. Its fruit is a dark-blue berry that has a whitish covering. (H up to 90' tall)

The dense leaves of eastern red cedar provide cover for many animals, large and small. Birds and small mammals nest amongst its branches and eat its berries. *Role*: 1. 2. 3. 4. 5. 6. 7.

jewe[illegible]d shooting star: The showy, purplish pink blossoms of jeweled shooting star appear to be arranged inside out. Normally, the stigma and stamen of a flower are tucked inside a cup of petals, but in the case of the jeweled shooting star, five stamen reach forward while the petals of the flower fall behind and reach in the opposite direction. H up to 10".

Jeweled shooting star is a rare and endangered plant in Illinois. During the spring, insects feed upon the pollen in its flowers. By late summer, the flowers have matured into brown, paper-thin fruits. When those fruits open, tiny seeds that birds can eat spill onto the cliffside. *Role*: 1. 2. 3. 4. 5. 6. 7.

purple cliff break fern: This delicate plant can be easily identified by its dark purple stem. Its leaves are green and hairless. It grows out of steep cliffsides at a right angle.

The leaves of purple cliff break fern are sometimes eaten by insects, especially beetles. *Role*: 1. 2. 3. 4. 5. 6. 7.

columbine: This lovely wildfower grows on the tops of rocks in pockets by soil. Its large blossoms are red on top and yellow below. H up to 18".

Insects visit columbine to collect pollen and nectar. Some birds probably pick at its seed-packed fruits. *Role*: 1. 2. 3. 4. 5. 6. 7.

poverty grass: This pale green plant is called poverty grass because it can grow in high, rocky areas where the soil and moisture are poor. Its slender and curling leaves reach only a few inches above the ground. Its oat-like seed heads are born at the top of tall, leafless stalks.

The seeds of poverty grass are an early summer food of birds and small mammals. Its leaves provide cover for animals as they hide or rest. Role: 1. 2. 3. 4. 5. 6. 7.

ANIMAL DESCRIPTIONS: (L = Length, W = Wingspan)

red admiral butterfly: This butterfly has black wings marked by orange-red bars and white spots. (L 1¾—2¼")

The red admiral butterfly spends its hours peacefully sipping the nectar of flowers. As it travels from flower to flower, it spreads the pollen that fertilizes their eggs and allows them to reproduce. *Role*: 1. 2. 3. 4. 5. 6. 7.

elephant stag beetle: This large beetle is reddish-brown but its legs and antennae are black. Its long, forked jaws jut out from its head like a pair of antlers. (L 1⅛—2⅜")

The elephant stag beetle eats the juices of plants. Even though it uses its big jaws to fight predators, it is often overpowered by snakes, birds, and mammals. *Role*: 1. 2. 3. 4. 5. 6. 7.

black rat snake: This large, stout snake is black with traces of white between its scales. (L 34-101")

The black rat snake is an extremely skillful climber and can scale a steep cliff or a tall tree with ease. It is also quite powerful and can squeeze birds, small mammals, and lizards to death. Hawks and large owls are about the only animals fast and strong enough to snag this big snake. *Role*: 1. 2. 3. 4. 5. 6. 7.

northern spring peeper: This small frog is tan or brown, usually with a distinct pinkish cast. It can be identified by the dark brown x-mark on its back. (L ¾—1⅜")

The spring peeper lives in trees and shrubs. During the springtime breeding season, the males whistle a soft, bird-like song. The females lay several hundred eggs in the water. This frog is eaten by lizards, snakes, birds, and mammals. Small insects are its prey. *Role*: 1. 2. 3. 4. 5. 6. 7.

northern fence lizard: This rough-scaled reptile is gray or light brown, marked by black bands and spots. (L 3½—7½")

The northern fence lizard lies its eggs in a decaying log. During the day, it often lays on that log basking in the sunlight. This fast and alert lizard catches all types of insects, but especially ants. Snakes, large birds, and mammals are the animals that prey on it. *Role*: 1. 2. 3. 4. 5. 6. 7.

peregrine falcon: This bird of prey is bluish to dark slate-gray above. Its tan to cinnamon underparts are barred and spotted with black. The best field marks are its black cap and facial stripe. (L 15", W 40")

The peregrine falcon is an endangered species in the United States. At one time, there were many falcons in Illinois, and they built their nests on the open ledges of cliffs. Unfortunately, peregrine falcons are now so rare, they no longer nest in

Illinois. However, they do migrate through our state and are often seen near cliffs and along waterways.

The peregrine falcon is an amazing hunter. If prey, always a smaller bird, is flying below the falcon, it executes a long, fast dive that may reach a speed of 200 miles per hour. When it reaches its target, it raps the smaller bird with its talons and the kill is instant. Few predators are known to take the fast and powerful peregrine falcon. *Role*: 1. 2. 3. 4. 5. 6. 7.

turkey vulture: This black bird is easily recognized by its bald, pink, and wrinkled head. (L 25", W 72")

The turkey vulture soars in wide circles, searching the ground below for food. It always feeds on animals that are already dead. In this way, it helps break apart dead materials so that the nutrients in them can be recycled. Few animals prey on this large bird. *Role*: 1. 2. 3. 4. 5. 6. 7.

belted kingfisher: This bird is blue above and white below. It can be told by the blue belt across its chest and the blue crest on its head. The female sports a rusty-colored belt across her upper belly. (L 12")

The belted kingfisher is a common bird along cliffside streams. Perched above the water on a ledge or a tree branch, the kingfisher maintains a constant watch for fish, its favorite prey. Once it spots a target, it dives headlong into the water and snatches the fish in its long bill. This handsome bird is preyed upon by falcons, hawks, and owls. *Role*: 1. 2. 3. 4. 5. 6. 7.

cliff swallow: This chunky, little bird has many colors in its body. Its back and wings are blue-black, striped with white. Its rump is orange and its forehead is tan. There is a light rusty band around its neck and throat. In flight, its square-tipped tail is a good field mark. (L 5")

The cliff swallow uses mud to build its cup-like nest and to plaster it onto the side of a cliff. It eats nothing but insects, and is able to capture dozens of them every day. Large snakes and birds of prey are the animals that feed on the cliff swallow. *Role*: 1. 2. 3. 4. 5. 6. 7.

bank swallow: This small swallow is brown above and white below. Its brown breastband is its best field mark. (L 4¾")

The nest of the bank swallow is easy to recognize. Just look along the side of a cliff or bluff. If you see a neat, round hole, chances are good it's the entrance to a bank swallow nest. Like the cliff swallow, the bank swallow feeds only on insects, and is preyed upon by larger birds and snakes. *Role*: 1. 2. 3. 4. 5. 6. 7.

gray fox: The upper parts of this large mammal are gray, while its breast and belly are white. Its legs and feet are rusty yellow. There is also some rusty yellow along the side of its neck and behind each ear. Its bushy tail is black at the tip and along the upper side. (L 39-41")

The gray fox is at home along heavily wooded bluffs. In a crevice between some rocks or in a hollow tree, it makes a den and raises its young. Out in the woods, it tracks down mice, rabbits, insects, and small birds. It also spends a lot of time picking apart and eating berries, fruits, acorns, and seeds. Because of its large size, the gray fox is preyed upon only by people. *Role*: 1. 2. 3. 4. 5. 6. 7.

bobcat: This bob-tailed mammal has mostly yellowish gray fur streaked with black. Its belly and inner legs are whitish dotted with black. (L 33")

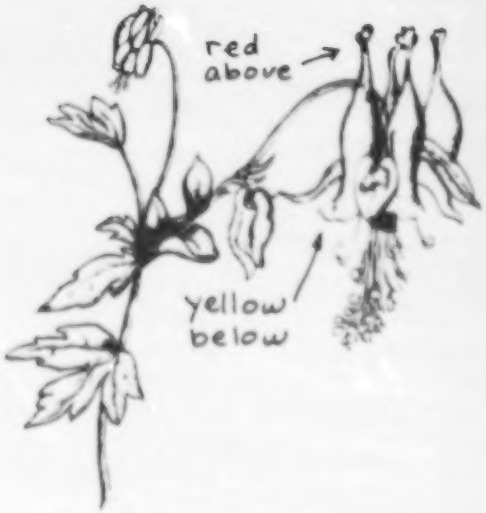
Mostly at night, the bobcat patrols wooded bluffs and river bottoms in search of prey. Mice, rabbits, squirrels, birds, and insects are all easy prey for this tough predator. The bobcat makes a cozy den for its bobkittens inside a rocky crevice or hollow log. It has no natural predators, and because it is a "threatened" species in Illinois, it is protected by law from hunting or trapping. *Role*: 1. 2. 3. 4. 5. 6. 7.

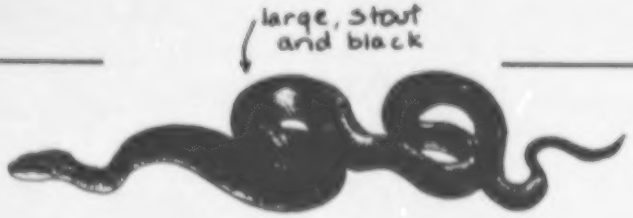
eastern wood rat: The back and head of this small mammal are brownish-gray, finely streaked with black. Its belly and throat are white. Its long tail is blackish above and dull white below. (L 15¼—16¼")

The eastern woodrat lives along rocky cliffs and bluffs in the Shawnee National Forest. It builds its nest inside a crevice or on top of a ledge. In this nest, the woodrat keeps a good supply of seeds, nuts, and berries for rainy and snowy days.

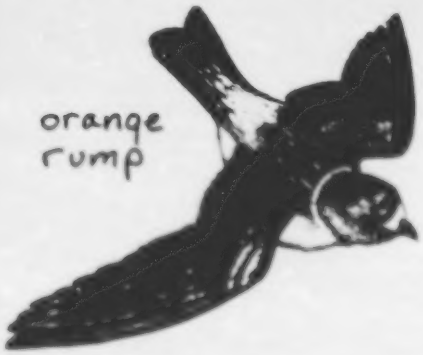
Just about every meat-eating animal in its habitat preys upon the eastern woodrat. It is an endangered species and, unfortunately, there are probably less than 100 of them left in Illinois. Role: 1. 2. 3. 4. 5. 6. 7.

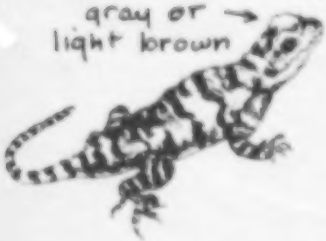
Cliffs/Bluffs Field Guide

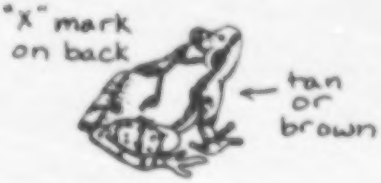




Cliffs/Bluffs Field Guide







DAY 3 - Predicting The Action Along a Cliff or Bluff

MISSION

Check out nine action scenes along a cliff or bluff and predict what will happen.

INSTRUCTIONS

The person in the illustration below is exploring the environment along an Illinois cliff. If you were also exploring a cliff or bluff, you would see alot of action: birds diving from the sky, snakes scaling up rocks, and mammals dodging about in the brush.

On this page and on page 69, six action scenes you might encounter during a cliff or bluff exploration are explained. It is your job to study the details of each scene and then decide what will happen next in the scene. In the space below each scene, there are several possibilities about what could happen next. Some of the possibilities are indeed possible, while others are not. Using your **Cliffs and Bluffs Field Guide** and your **Spy Manual**, circle the number beside what you think will actually happen next in the scene. Once you are finished predicting the action in the nine scenes, write your conclusion about Cliffs and Bluffs on page 69.

ACTION SCENE #1

A jeweled shooting star is growing along a moist, mossy bluff. A red admiral butterfly is perched on one of its pinkish purple blossoms.

What Will Happen?

1. The jeweled shooting star will continue to make plant food through photosynthesis.
2. The blossoms of the jeweled shooting star will open up like the blossoms of venus fly trap and capture the red admiral butterfly.
3. The red admiral butterfly will feed on the nectar of the jeweled shooting star, thereby helping it carry out the process of pollination.
4. The red admiral butterfly will bypass the shooting star because it preys on mice and insects.

ACTION SCENE #2

A peregrine falcon is flying high toward a steep cliff-side. A bank swallow is flying in the same direction a hundred feet below the falcon. On the face of the cliff, there is a neat, round nesting hole.

What Will Happen?

1. The peregrine falcon will fly into the nesting hole.
2. The bank swallow will swoop up into the air and capture the peregrine falcon.
3. The peregrine falcon will dive at an incredible speed of almost 200 mph and seize the bank swallow in its talons.
4. The peregrine falcon will dive and try to kill the bank swallow with its bill.
5. The bank swallow will escape into the nesting hole in the cliffside.

ACTION SCENE #3

Plastered onto the side of a cliff, there is a cup-like nest made of mud and sticks. Inside the nest, two young cliff swallows are being fed by an adult cliff swallow. Fifteen feet below the nest, a purple cliff break fern is growing between some rocks. Just to the left of the fern, there is a black rat snake.

What Will Happen?

1. The cliff swallow will attack and kill the black rat snake.
2. The black rat snake will lose its footing and

fall off of the cliff.

3. The black rat snake will slither into the cliff swallow nest, where it will squeeze to death and swallow the two young birds. The adult bird will escape and raise another brood of young at a later date.
4. The black rat snake and the cliff swallow will both feed on the leaves of the purple cliff break fern.

ACTION SCENE #4

A bobcat is walking down the slope of a wooded bluff. Just ahead of the bobcat, there is a large eastern red cedar. On the ground beneath the cedar, an eastern woodrat is gathering berries.

What Will Happen?

1. The eastern woodrat will attack the bobcat.
2. The bobcat will pounce onto the eastern woodrat.
3. The eastern woodrat will continue to nibble on the berries of the eastern cedar. Then, the bobcat will try to attack the woodrat, but the woodrat will escape into its underground burrow.
4. The bobcat will ignore the eastern woodrat as it climbs up the trunk of the eastern red cedar. When it gets about halfway up the tree, it will make a nest for its young in the branches.

ACTION SCENE #5

A pin oak tree is standing along the shady bank of a cliff-side stream. Up high in the oak, a northern spring peeper is sitting on one of its leaves. Above the oak, a turkey vulture is soaring in the sky.

What Will Happen?

1. The turkey vulture will land and feed on the acorns of the pin oak.
2. The turkey vulture will dive from the sky and nail the spring peeper.
3. The turkey vulture will continue to soar in the sky until the spring peeper or another animal turns up dead. Then, it will land and feed on the dead body.
4. The spring peeper will sing a mating song that sounds a like a train moving down its track.
5. The spring peeper will move down to the stream and lay its eggs in the water.

ACTION SCENE #6

It is a warm, summer day in sothern Illinois. A person is walking along a beautiful stream at the base of a cliff.

What Will Happen?

(Circle as many as you want)

1. The person will skip stones in the cliffside stream.
2. The person will throw garbage into the stream.
3. The person will shoot at any animal he or she sees.
4. The person will enjoy the cliff world and will be careful to leave it just as he or she found it.
5. The person will start a campfire and then leave before he or she has put the fire completely out.
6. The person will do everything he or she can do to protect the cliff environment because it is a valuable part of our natural heritage in Illinois.

Your Conclusion about Cliffs and Bluffs:

In the space below, and on a separate sheet of paper explain why every plant and animal living along cliffs and bluffs is a valuable member of the environment. Be sure to include your ideas about how human beings can be helpful to the well-being of cliffs and bluffs.

Chapter 6

Urban Sleuthwork

MISSION

Spy on the urban habitats in your neighborhood to find plants and animals.

INSTRUCTIONS

1. This is an excercise that you can do by yourself, with a classmate, or with your whole class.
2. Your mission is to find as many plants and animals as you can in the city or town where you live. You can look for them in any type of natural habitat–a park, your backyard, a roadside, a pond, or a vacant lot.
3. For every plant you find, prepare a Plant Life Chart like the one shown below. For every animal you spy, prepare an Animal Life Chart like the one shown below. For every Life Chart you prepare, award yourself 25 Sleuthwork points. If you earn 100 or more points, you are entitled to sign your name to the official Urban Sleuthwork Certificate on page 42.
4. Chapter 3 contains information you will need to conduct your urban sleuthwork. Be sure to use the *Urban Field Guide* on pages 27-31 to help you identify plants and animals. If you spy a species that is not in your *Field Guide* and that you can't identify from another source, please go ahead and prepare a Life Chart for it anyway.

PLANT LIFE CHART

Name: _____

Height: _____

Type: (circle one) flower, shrub, vine, tree.

Color of bark: _____

Color of leaves: _____

Shape and color of fruit, seed, nut, or berry:

_____

List any woodpecker holes, nests, or webs in plants: _____

_____

Draw plant here:

ANIMAL LIFE CHART

Name: _____

Length: _____

Type: (circle one) insect, butterfly, worm, amphibian, reptile, bird, mammal.

Color of animal: _____

Special features (tail, crest, stripes, spots, etc.):

_____

How does the animal travel? _____

Fur present? _____

Is animal's nest nearby? _____

Draw animal here:

Chapter 7

Building a Cardinal Model

MISSION

Construct a model of a cardinal, the State Bird of Illinois.

INSTRUCTIONS

1. Paste page 72 onto a piece of white construction paper.
2. Color the pieces of the cardinal model.
3. Following the Assembly Directions listed below, construct your model. *Please be sure to read all of the Directions before you do any cutting or pasting.*

Assembly Directions

(*Special Note*: When working with the model pieces, *cut* along the solid black lines; *fold* the dotted lines.)

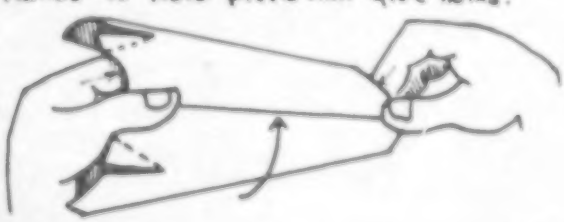
① Fold head piece on dotted line. Glue 'cheek' tabs over to dotted line.

② Glue back neck of head piece to tabs A & B carefully. It will form a curve. Keep a finger inside head to help hold the glued piece stable.

③ Fold tabs on feet down & curl feet with scissors or roll tightly around a pencil.

④ Fold dotted lines on wing carefully. 'score' or draw on the dotted lines with a pencil first to make folding easier. Glue areas that are cut over to the dotted line. Tabs C & D fold under the wing. Wing will be curved.

⑤ Red body piece so that side 'BB' is glued over side 'AA' to the dotted line. Use both hands to hold piece until glue holds.



⑥ Glue tabs marked 'X' over to dotted line.

⑦ Glue the 'O' tabs same as 'X' tabs.

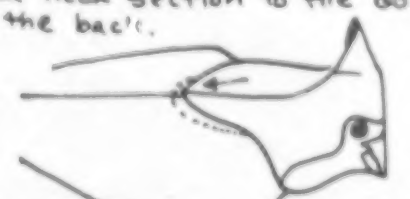
⑧ Glue corner flap over 'Y'. Body will form a cone shape.

⑨ Clip solid lines on breast piece & glue piece over the hole. Clipped edges allow for 'shaping'. You may have to squeeze the body gently until edges are glued tightly.

⑩ Fold tail sections on dotted lines & glue them to edges of upper tail. You may need to use a pencil to help hold the parts together.

⑪ Slide tail in & glue top to tail matching the shape of dotted line. Glue bottom section to tail also.

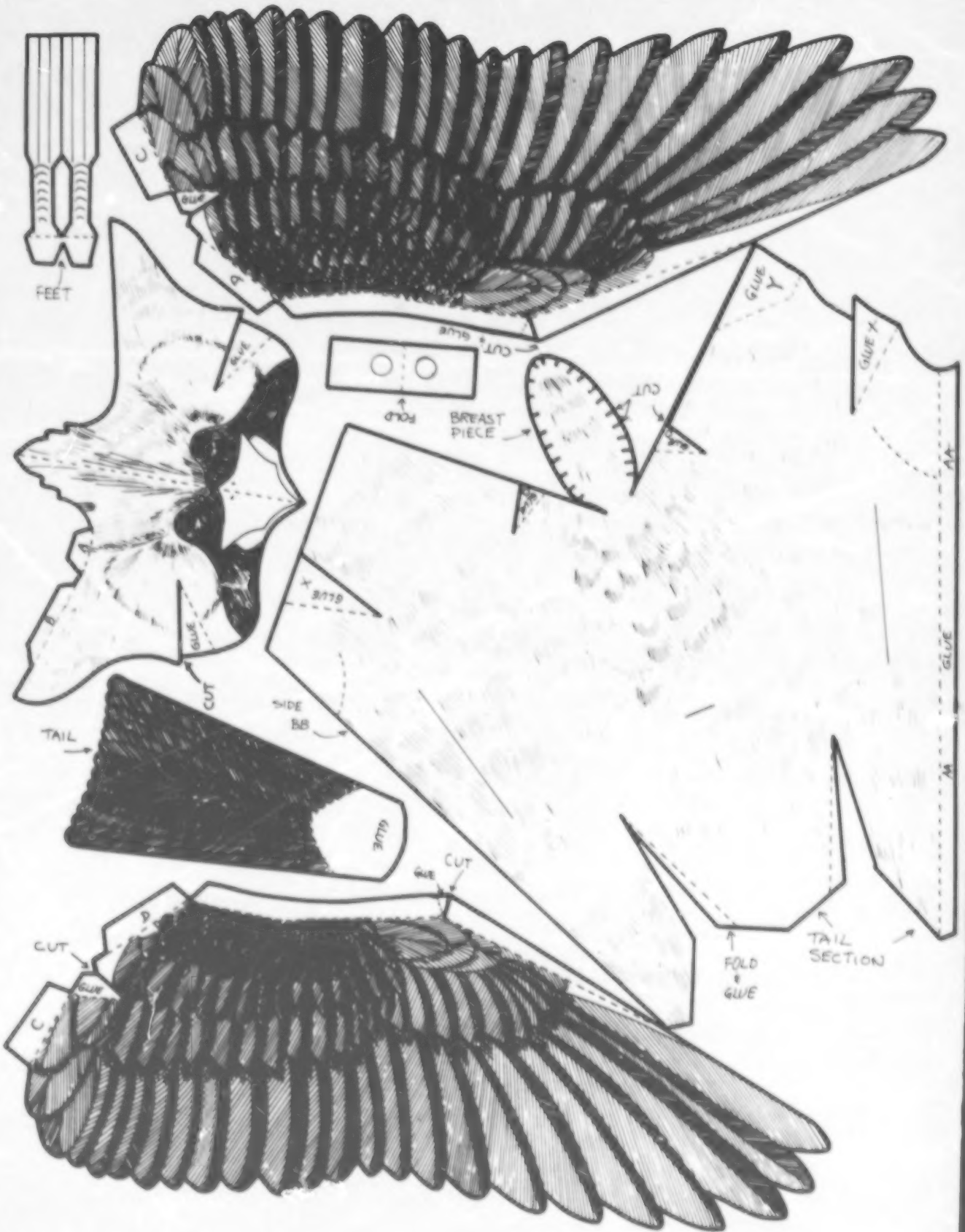
⑫ Glue head piece to body. Match the back neck section to the dotted lines on the back.



⑬ Glue wing tabs 'C' & 'D' to solid line on the back. Press gently (tabs under wing) until glue holds. It may take a few minutes.

⑭ Glue the feet tabs to the solid line on the cardinal belly.

⑮ Fold hanging tab, punch holes, and glue tab to the back right behind the head piece. Let glue dry completely before hanging.


FEET
C
GLUE
D
CUT
GLUE
FOLD
BREAST PIECE
GLUE
Y
GLUE Y
CUT
GLUE
X
GLUE
CUT
SIDE BB
TAIL
GLUE
CUT
GLUE
D
CUT
GLUE
C
GLUE
GLUE
FOLD & GLUE
TAIL SECTION

1
2
3
4
54
5
6
7
10
8
13
9
12
11
15
14
16
DUNES

48
53
47
49
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38
42
URBAN

ILLINOIS SPECIAL HABITATS ARE A HOME ADDRESS FOR:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. midland painted turtle
10. _____
11. _____
12. _____
13. Fowler's toad
14. _____
15. bearberry
16. _____
17. _____
18. big brown bat
19. _____
20. _____
21. little brown bat
22. _____
23. _____
24. _____
25. _____
26. _____
27. _____
28. _____
29. _____
30. _____
31. _____
32. _____
33. _____
34. _____
35. _____
36. _____
37. _____
38. _____
39. northern cardinal
40. _____
41. _____
42. _____
43. _____
44. gray catbird
45. monarch
46. _____
47. _____
48. _____
49. chimney swift
50. _____
51. _____
52. _____
53. _____
54. _____